

ENVIRONMENTAL SAMPLING -- PRESS RELEASES
(1959 and continuing)

This document has been approved for release
to the public by:

Arvin S. J. J. J. 4/18/95
Technical Information Officer Date
Oak Ridge K-25 Site

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7314
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the U.S. DEPARTMENT OF ENERGY
under Contract DE-AC05-84OR21400

Report #1428



INTERNAL CORRESPONDENCE

NUCLEAR DIVISION

POST OFFICE BOX P, OAK RIDGE, TENNESSEE 37831

To (Name) Dr. K. Z. Morgan
Company
Location ORNL

Date January 19, 1965

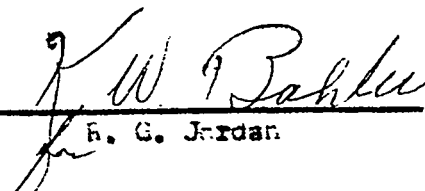
Originating Dept.

Answering letter date

Copy to Mr. K. W. Bahler
Mr. A. F. Becher
Mr. C. E. Center
Health Physics File - RC ✓

Subject News Release on Environmental
Surveys

Attached are data for the semiannual news release, as requested by AEC-CRC,
covering environmental surveys made by our plant forces at off-plant loca-
tions during the second half of CY-1964.


K. W. Bahler
for E. G. Jordan

RGJmh

Attachment

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JULY THRU DECEMBER, 1964

The results of sampling of the environs of the Oak Ridge Gaseous Diffusion Plant during the second half of 1964 revealed that the amount of uranium in the surface waterways and in the air as far as five miles from the plant area is not significantly different from the normal background values established for this region.

The average air-borne alpha activity at the three five-mile sampling stations continued to be only a small fraction of the maximum permissible concentration for the general population. Environmental air sampling data are shown in Table 1 and the continuous sampling points in Figure 1.

Continuous sampling of the surface waterways adjacent to the plant revealed no instance where the uranium concentration exceeded the maximum permissible concentration specified for water (MPC_w).^{*} The average activity of natural uranium materials in the Clinch River reflecting the effects of all of the Oak Ridge plants was only about 0.1% of the MPC_w . Sampling data are shown in Table 2 and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements at three locations surrounding the ORGDP area averaged 0.03 mr/hour. This approximates the average background levels obtained throughout the United States by the U. S. Public Health Service Radiation Surveillance Network, employing similar methods and detection instruments.

^{*} Manual Chapter AEC-0524, Annex 1, Table 2, "Concentrations in Air and Water Above Natural Background."

TABLE 1
ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT
JULY-DECEMBER 1964

| Distance from Center of Plant | Type of Analysis | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | Average % MPCa** |
|----------------------------------|---------------------|-------------------|--------------------------------------|-----|-------|-----|----------------------------------|---------------------|
| | | | Direction from Plant | | Total | | Max. Permissible Conc. (MPCa) | |
| | | | N | NE | SW | | | |
| 5-Mile Radius* | Gross Alpha | 1532 | < 1 | < 1 | < 1 | < 1 | 20.0 | 7.5 |
| | | | 1.5 | 1.6 | 1.5 | 1.5 | | |
| | | | 7 | 8 | 11 | 11 | | |

* Normal Sampling Frequency: Continuous; averaged over 8 hours.

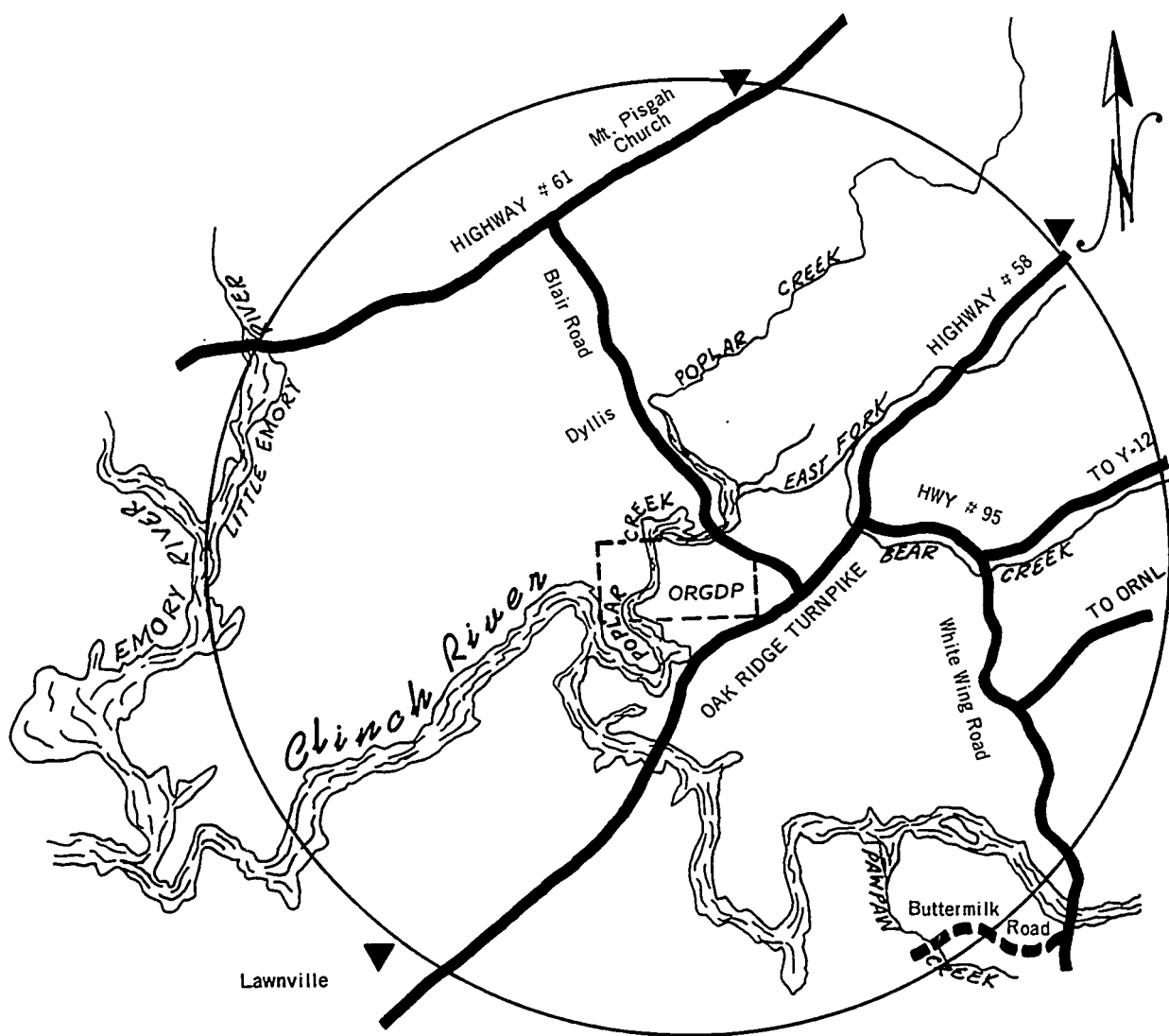
** Maximum permissible concentrations for continuous exposure of the general population.

TABLE 2
ENVIRONMENTAL SAMPLING - LOCAL STREAMS
OAK RIDGE GASEOUS DIFFUSION PLANT
JULY-DECEMBER 1964

| Location of Point* | Type of Analysis | No. of Samples | Units of 10 ⁻⁸ μc/cc | | | | Average % MPC _W ** |
|--------------------|-----------------------|----------------|---------------------------------|------|--|------|-------------------------------|
| | | | Plant Experience | | Max. Permissible Conc. (MPC _W) | | |
| | | | Low | High | Av. | | |
| Upstream | Uranium Concentration | 4 | 0 | 0.2 | 0.1 | 2000 | < 0.1 |
| Downstream | Uranium Concentration | 4 | 0 | 0.1 | 0.1 | 2000 | < 0.1 |

* Normal Sampling Frequency: Continuous; composited over one quarter.

** Maximum permissible concentrations for continuous exposure to the general population.



SAMPLING POINTS OF OUTSIDE ENVIRONS - ORGDP
AIR

▼ Sampling Location - Five Miles from Plant

FIGURE 1

ENVIRONMENTAL SAMPLING
OAK RIDGE GASEOUS DIFFUSION PLANT
SAMPLE POINTS
● Outside Control Area
◐ Within Control Area

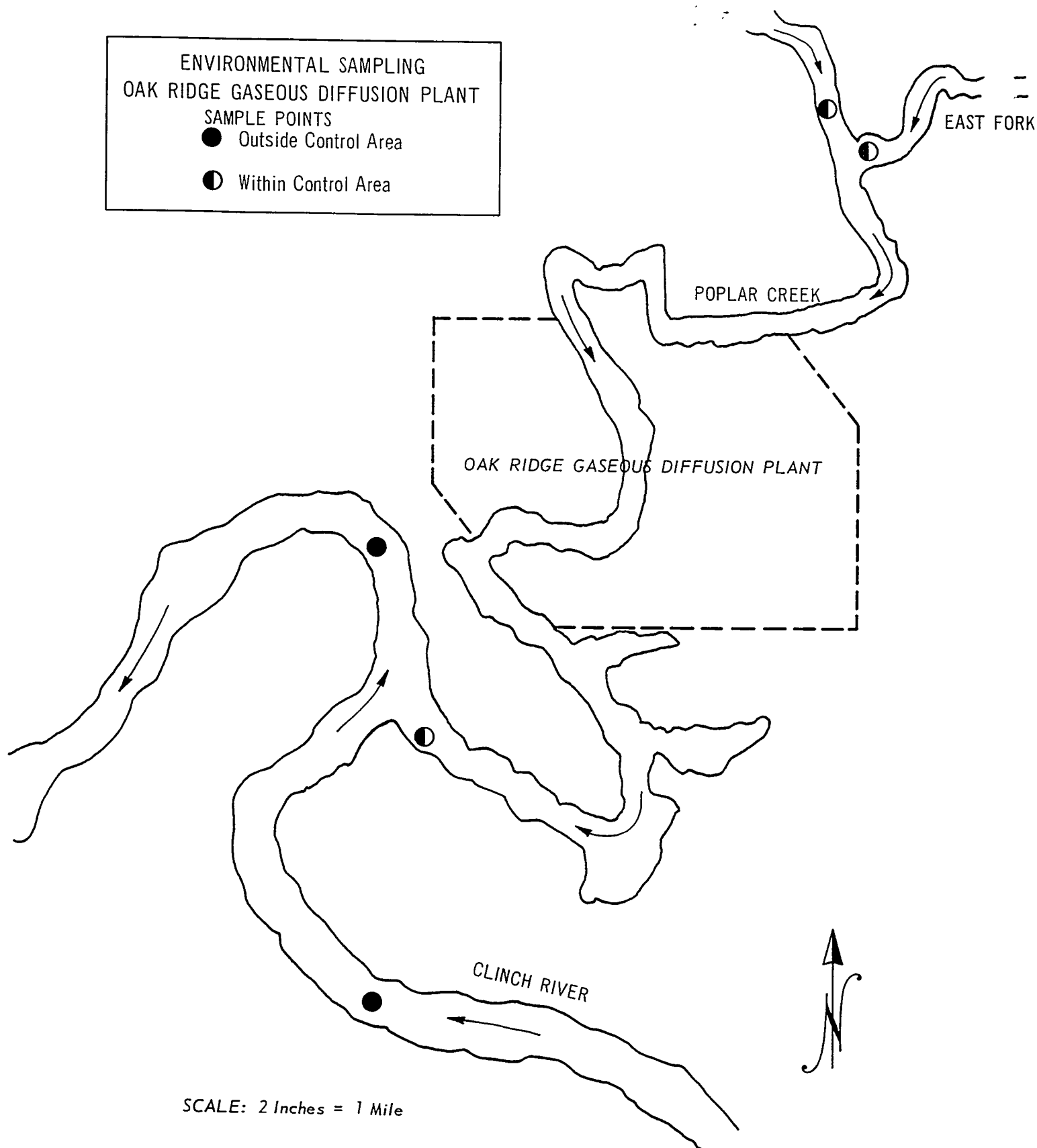


FIGURE 2



UNION CARBIDE CORPORATION

NUCLEAR DIVISION

P. O. BOX P, OAK RIDGE, TENNESSEE 37831

Delivered
Physica

September 14, 1964

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie, Manager
Oak Ridge Operations

Gentlemen:

Dissemination to the Public of Data
on Environmental Levels of Radioactivity

As requested, we are enclosing eighty copies of the report for the first half of 1964 on Environmental Levels of Radioactivity for the Oak Ridge Area.

Very truly yours,

C. E. Larson
C. E. Larson
Vice President

CEL:JAS:dg

Enclosures

cc w/encl.: A. F. Becher (2) ✓
F. R. Bruce
C. E. Center (4)
D. M. Davis (10)
W. H. Jordan
K. Z. Morgan
J. A. Swartout (2)

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

(Report for Period, January - June, 1964)

Compiled by the

Applied Health Physics Section

Health Physics Division

OAK RIDGE NATIONAL LABORATORY

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to trenches located in the Conasauga shale formation. (The use of pits for disposal of liquid waste was discontinued as of November, 1962.) Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

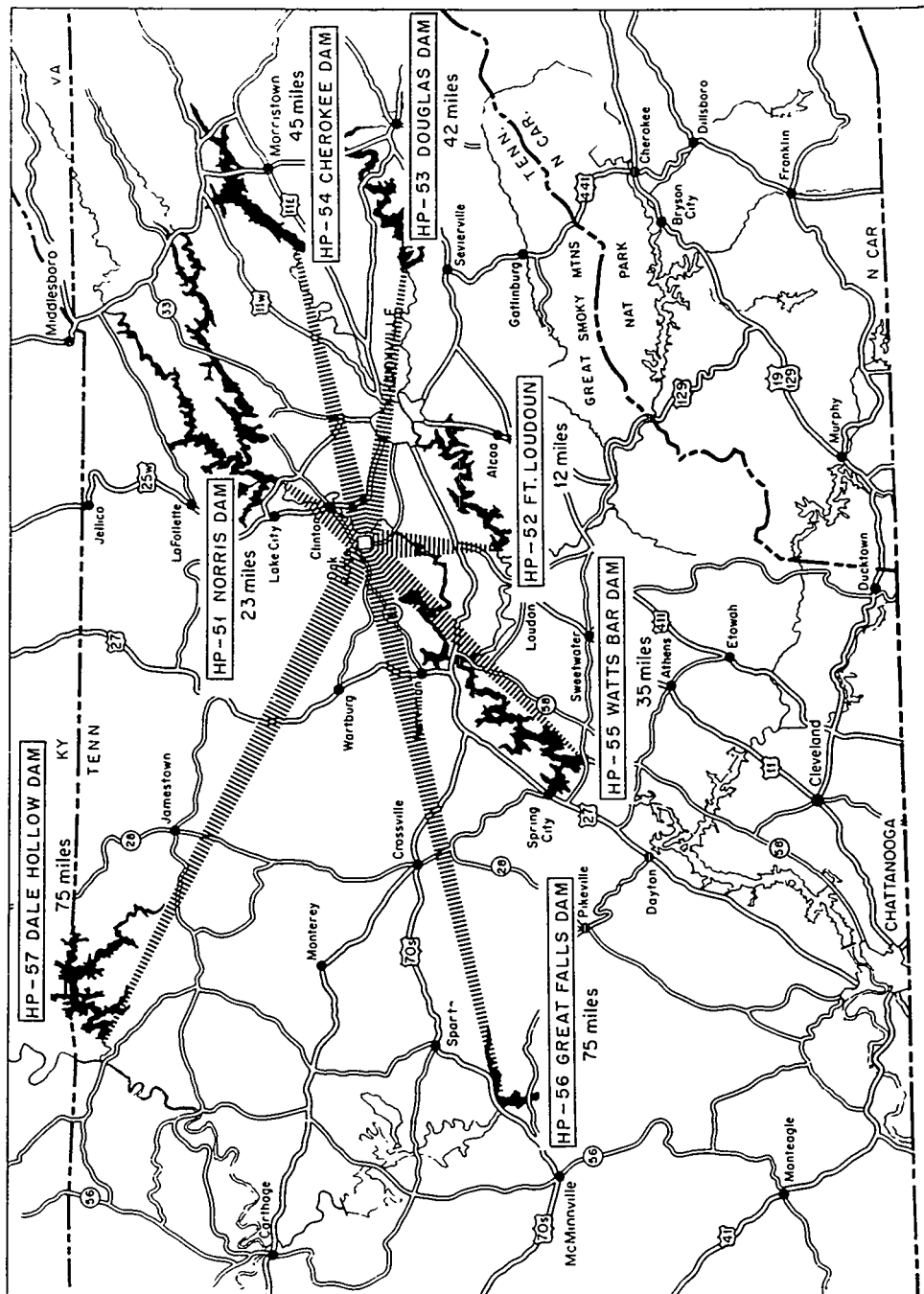
Air Monitoring

Atmospheric contamination by long-lived fission products and by fallout occurring in the general environment of East Tennessee is monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provide data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of seven stations encircling the Oak Ridge Area at distances of from 12 to 75 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c/cc}$ of air sampled.

Atmospheric contamination by alpha-emitting materials, interpreted as uranium, is determined by taking continuous air samples at three locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

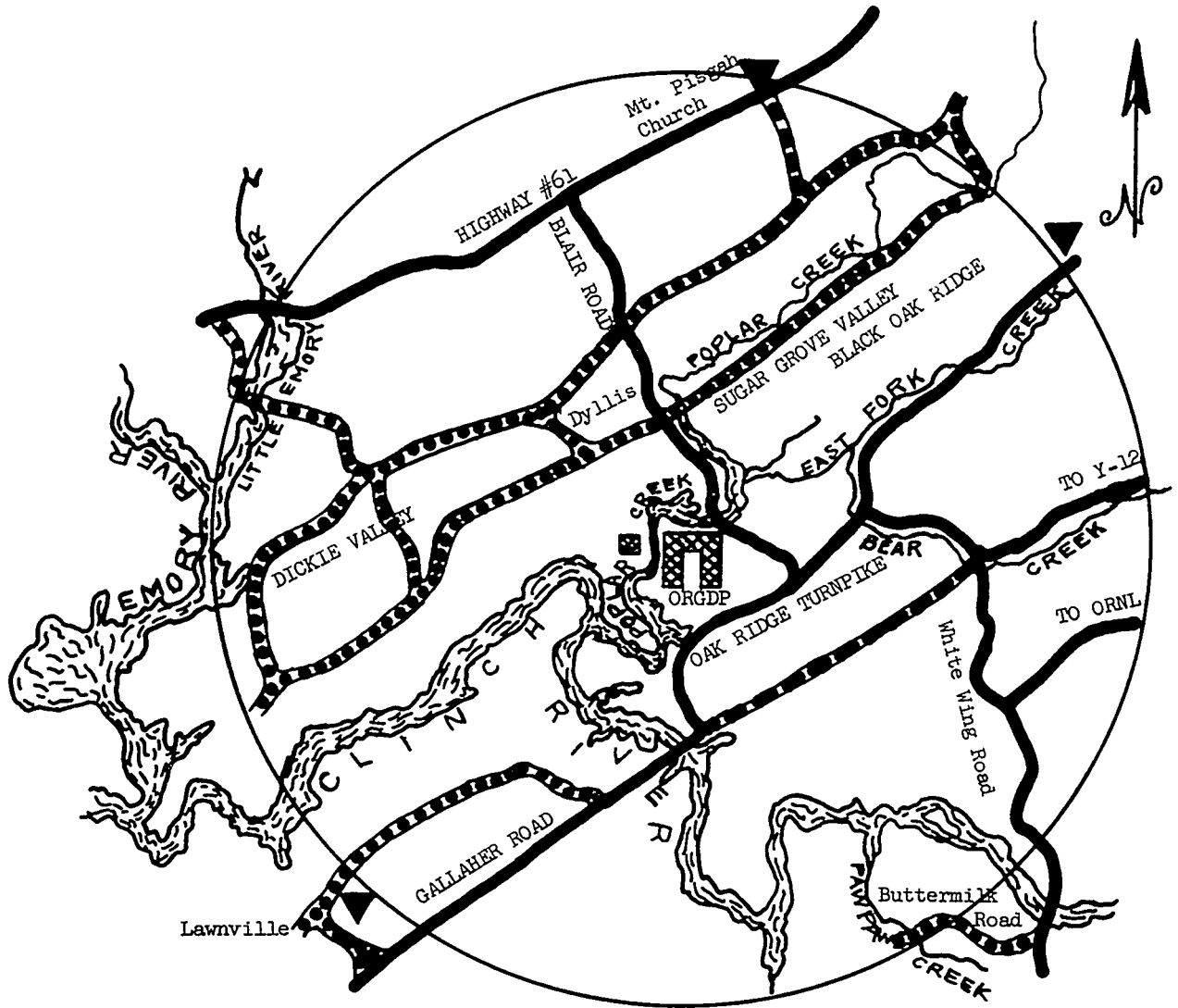
Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

AIR

▼ Sampling Location - Five Miles from Plant

Figure 3

and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as specified by AEC Manual, Chapter 0524. The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

Analyses are made of the effluent for the long-lived radionuclides only since cooling time and hold-up time in the waste effluent system is such that short-lived radionuclides are not present. The concentrations of those isotopes present in significant amounts are determined by analysis. A weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as specified by AEC Manual, Chapter 0524.¹ The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

Gamma Measurements

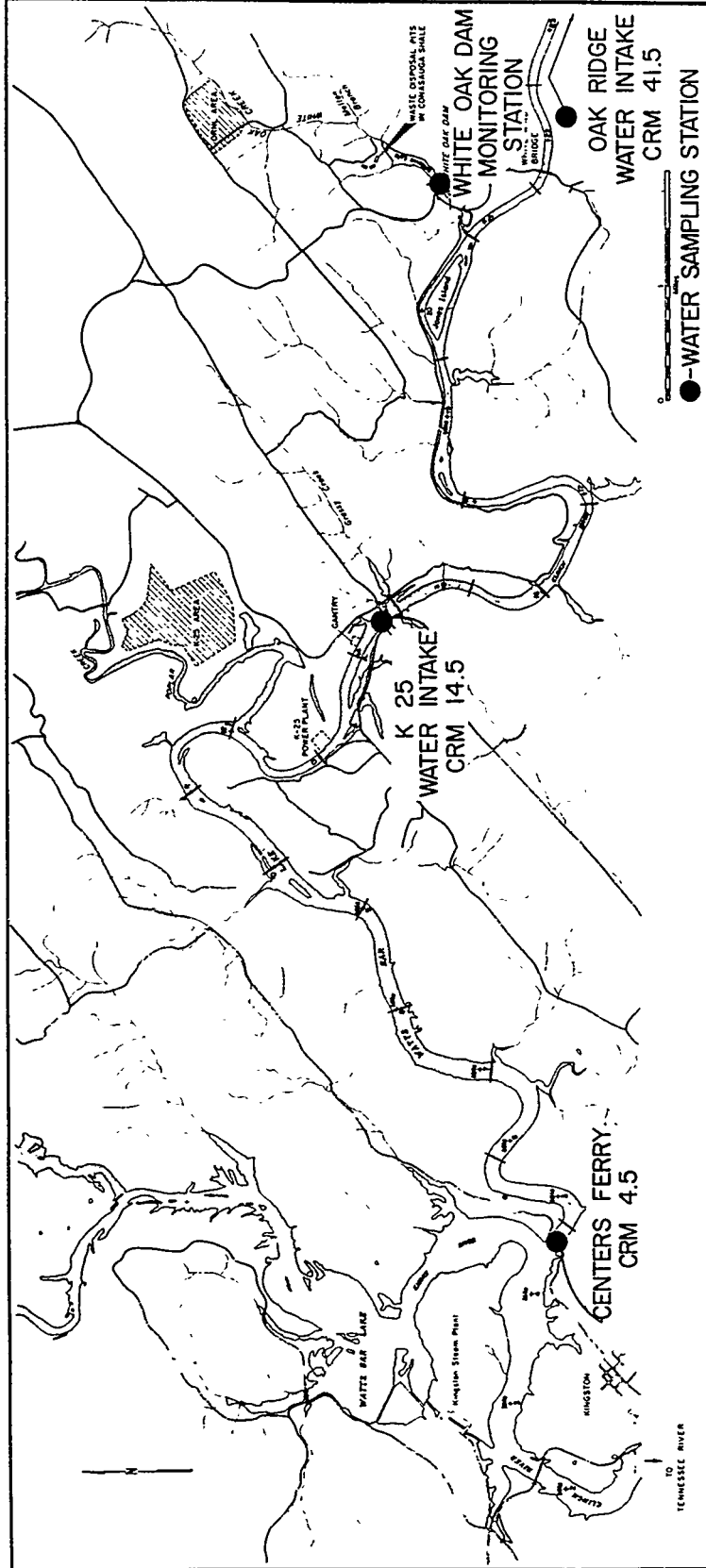
External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Müller tube at a distance of three feet above the ground, and the results are tabulated in terms of mR/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the first half of 1964 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

¹AEC Manual, Chapter 0524, Appendix, Annex 1, Table II.

UNCLASSIFIED
ORNL-DWG. 64-698



WATER SAMPLING LOCATIONS

Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R2

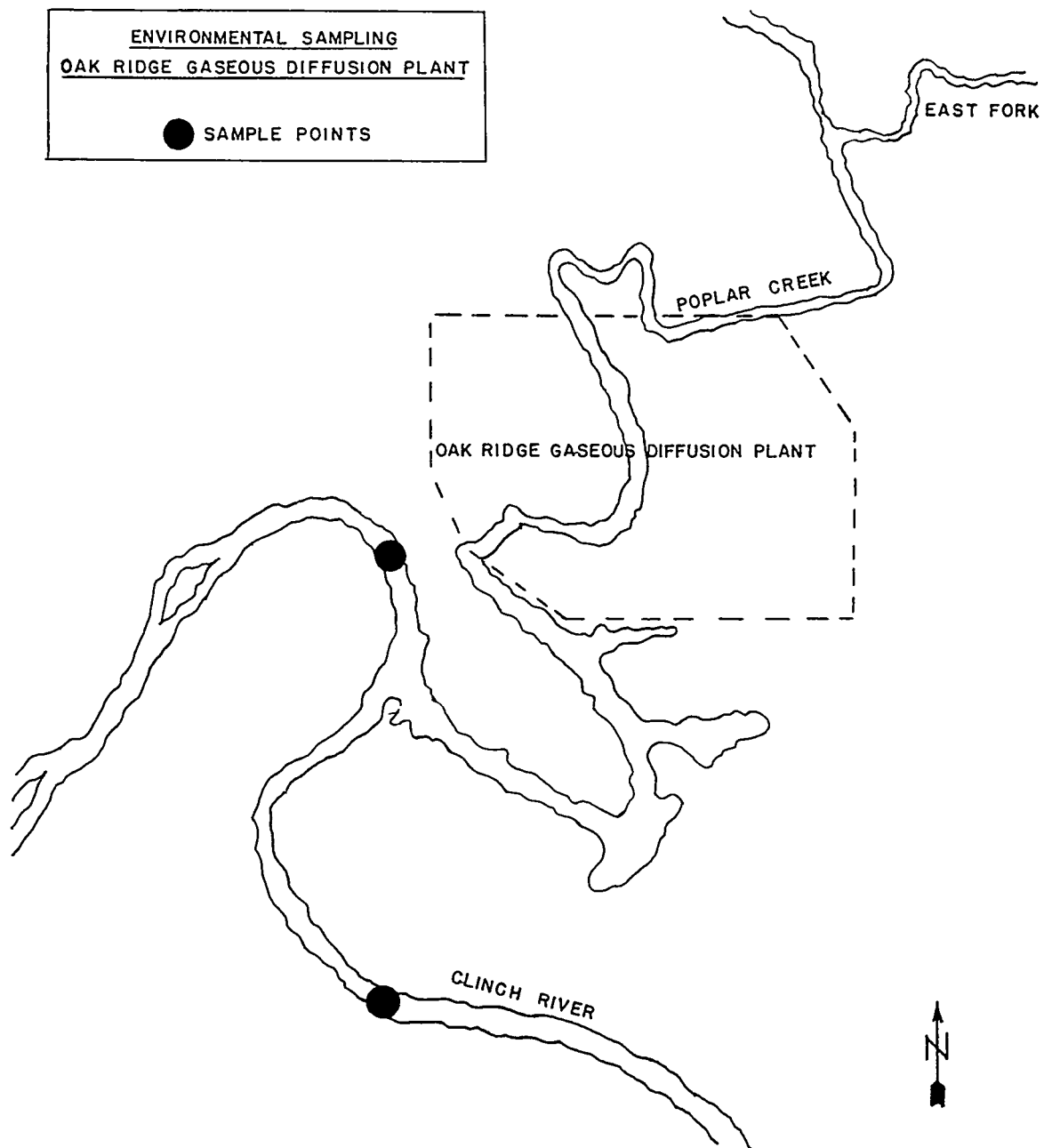


Figure 5

The average air contamination levels for gross beta activity, as shown by the continuous air monitoring filter data for the immediate and remote environs of the plants, were 1.3% and 1.7%, respectively, of the maximum permissible concentration for populations in the neighborhood of a controlled area. These values are approximately 30% lower than those of the last half of 1963 but are not significantly different from the average of those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network for the period January through May, 1964.

The average air-borne alpha activity in the environs of the ORGDP, five miles from ORGDP, was 18% of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The calculated average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of most of the wastes, and the measured average concentration at Mile 4.5, near Kingston, Tennessee, were 24×10^{-8} $\mu\text{c/ml}$ and 9.3×10^{-8} $\mu\text{c/ml}$ respectively. These values are 3.5% and 2.0% of the weighted average maximum permissible concentration (MPC)_w. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 3.1×10^{-11} $\mu\text{c/ml}$ which is < 0.001% of the weighted average (MPC)_w value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all Oak Ridge Plants, was < 0.01% of the (MPC)_w for uranium.

Fall-out from weapons tests continues to result in increased concentrations of ^{90}Sr and ^{144}Ce in Clinch River water, Table IV, CRM 41.5, upstream from the point of entry of the wastes into the river.

External gamma radiation in the Oak Ridge Area averaged 0.014 mR/hr.

Conclusion

The air and ground contamination found in both the immediate and remote environs of Oak Ridge is due primarily to fall-out from sources other than local plant operations. From analysis of the data presented, it may be concluded that the Oak Ridge Operations contributed little to air or ground contamination in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes from local operations, the resulting concentrations in the river are well below the maximum permissible concentration for populations residing in the neighborhood of a controlled area.

TABLE I
CONTINUOUS AIR MONITORING DATA
Long-Lived Gross Beta Activity of
Particulates in Air

January - June, 1964

| Station Number | Location | Number of Samples Taken | Units of $10^{-13}\mu\text{c/cc}$ | | | % (MPC) _a ^c |
|---------------------------|--------------------|----------------------------|-----------------------------------|----------------------|---------|--------------------------------------|
| | | | Maximum ^a | Minimum ^b | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-21 | Kerr Hollow Gate | 26 | 29 | 5 | 13 | 1.3 |
| HP-32 | Midway Gate | 26 | 27 | 4 | 15 | 1.5 |
| HP-33 | Gallaher Gate | 26 | 20 | 4 | 11 | 1.1 |
| HP-34 | White Oak Dam | 26 | 25 | 5 | 12 | 1.2 |
| HP-35 | Blair Gate | 29 | 35 | 5 | 14 | 1.4 |
| HP-36 | Turnpike Gate | 180 ^d | 30 | 6 | 14 | 1.4 |
| HP-37 | Hickory Creek Bend | 26 | 26 | 5 | 13 | 1.3 |
| Average | | | | | 13 | 1.3 |
| <u>Remote Stations</u> | | | | | | |
| HP-51 | Norris Dam | 26 | 44 | 7 | 16 | 1.6 |
| HP-52 | Loudoun Dam | 26 | 34 | 4 | 17 | 1.7 |
| HP-53 | Douglas Dam | 26 | 28 | 6 | 17 | 1.7 |
| HP-54 | Cherokee Dam | 26 | 48 | 4 | 19 | 1.9 |
| HP-55 | Watts Bar Dam | 25 | 42 | 7 | 20 | 2.0 |
| HP-56 | Great Falls Dam | 26 | 29 | 5 | 14 | 1.4 |
| HP-57 | Dale Hollow Dam | 26 | 34 | 6 | 16 | 1.6 |
| Average | | | | | 17 | 1.7 |

^aMaximum weekly average concentration.

^bMinimum weekly average concentration.

^c(MPC)_a is taken to be $10^{-10} \mu\text{c/cc}$ as specified in AEC Manual, Chapter 0524, Appendix, Annex 1, Table II.

^dSamples collected on daily schedule beginning 5/7/62. Maximum and minimum daily average concentrations were $4.9 \times 10^{-13} \mu\text{c/cc}$ and $0.2 \times 10^{-13} \mu\text{c/cc}$ respectively.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA

January - June, 1964

| Distance from Center of Plant | Type of Analyses | No. of Samples* | Units of $10^{-13}\mu\text{c/cc}$ | | | | |
|----------------------------------|---------------------|--------------------|-----------------------------------|------------|------------|---------|--------------------|
| | | | Direction from Plant | | | Average | (MPC) _a |
| | | | North | North East | South West | | |
| 5 Mile Radius | Gross Alpha | 1595 | 3.0 | 4.5 | 4.0 | 3.5 | 20 |
| | | | | | | | 18 |

* Normal Sampling Frequency: Continuous, averaged over 8 hours.

TABLE III
CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

January - June, 1964

| Number of Samples Taken | Units of 10^{-7} $\mu\text{c/ml}$ | | | % of $(\text{MPC})_w$ |
|----------------------------|-------------------------------------|----------------------|---------|-----------------------|
| | Maximum ^a | Minimum ^b | Average | |
| 183 | 8.2 | 0.23 | 2.4 | 3.5 |

^aMaximum weekly average.

^bMinimum weekly average.

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

January - June, 1964

| Location | Units of 10 ⁻⁸ μc/ml | | | | | | Average Beta Activity | (MPC) _w ^a | % of (MPC) _w |
|-----------------------|---------------------------------|-------------------|-------------------|-------------------|------------------|-------------------------------------|-----------------------|---------------------------------|-------------------------|
| | ⁹⁰ Sr | ¹⁴⁴ Ce | ¹³⁷ Cs | ¹⁰⁶ Ru | ⁶⁰ Co | ⁹⁵ Zr - ⁹⁵ Nb | | | |
| Mi. 41.5 ^b | 0.14 | 0.12 | 0.06 | 0.41 | * | 0.01 | 0.72 | 143 | 0.50 |
| Mi. 20.8 ^c | 0.29 | 0.01 | 0.27 | 8.4 | 0.60 | <0.01 | 24 | 658 | 3.5 |
| Mi. 4.5 | 0.36 | 0.13 | 0.43 | 7.7 | 0.65 | 0.05 | 9.3 | 462 | 2.0 |

^aWeighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides specified by AEC Manual, Chapter 0524, Appendix, Annex 1, Table II.

^bSampling station moved from Clinch River Mile 33.2 to Mile 41.5 about January 1, 1962.

^cValues given for this location are calculated values based on levels of waste released and the dilution afforded by the river; they do not include amounts of radioactive material (e.g., fall-out) that may enter the river upstream from CRM 20.8.

TABLE V
URANIUM CONCENTRATION IN THE CLINCH RIVER

January - June, 1964

| Sampling Point | Type of Analyses Made | No. of Samples* | Units of 10^{-8} $\mu\text{c}/\text{ml}$ | | | | % (MPC) _w |
|-----------------------|-----------------------|-----------------|--|---------|---------|--------------------|----------------------|
| | | | Maximum | Minimum | Average | (MPC) _w | |
| Upstream from ORGDP | Uranium Concentration | 24 | 0.5 | 0 | 0.1 | 2000 | < 0.01 |
| Downstream from ORGDP | Uranium Concentration | 24 | 0.8 | 0 | 0.1 | 2000 | < 0.01 |

*Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS

mR/hr

January - June, 1964

| Station Number | Location | Jan. | Feb. | March | April | May | June | Average |
|----------------|-------------------------|-------|-------|-------|-------|-------|-------|---------|
| 1 | Solway Gate | 0.015 | 0.016 | 0.014 | 0.015 | 0.016 | 0.012 | 0.015 |
| 2 | Y-12 East Portal | 0.013 | 0.013 | 0.012 | 0.010 | 0.013 | 0.010 | 0.012 |
| 3 | Newcomb Road, Oak Ridge | 0.013 | 0.013 | 0.016 | 0.013 | 0.016 | 0.014 | 0.014 |
| 4 | Gallaher Gate | 0.016 | 0.020 | 0.016 | 0.011 | 0.018 | 0.013 | 0.016 |
| 5 | White Wing Gate | 0.013 | 0.013 | 0.010 | 0.013 | 0.014 | 0.013 | 0.013 |
| Average | | 0.014 | 0.015 | 0.014 | 0.012 | 0.015 | 0.012 | 0.014 |

Note: These readings were taken with a calibrated Geiger-Müller tube at a distance of three feet above the ground.

The background in the Oak Ridge area in 1943 was determined to be approximately 0.012 mR/hr.

**UNION
CARBIDE**

INTERNAL CORRESPONDENCE

NUCLEAR DIVISION

POST OFFICE BOX P, OAK RIDGE, TENNESSEE 37831

To (Name) **Dr. K. Z. Morgan**
Company
Location **ORNL**

Date **July 23, 1964**

Originating Dept.

Answering letter date

Copy to **Mr. X. W. Sahler**
Mr. A. F. Becker
Mr. C. E. Conter
✓ **Health Physics File - RC**

Subject **News Release on Environmental
Surveys**

Attached are data for the semiannual news release, as requested by AEC-ORO,
covering environmental surveys made by our plant forces at off-plant loca-
tions during the first half of CY-1964,



R. G. Jordan

RGJ:epo

Attachment

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JANUARY THRU JUNE, 1964

The results of sampling of the environs of the Oak Ridge Gaseous Diffusion Plant during the first half of 1964 revealed that the amount of uranium in the surface waterways and in the air as far as five miles from the plant area is not significantly different from the normal background values established for this region.

The average air-borne alpha activity at the three five-mile sampling stations continued to be only a small fraction of the maximum permissible concentration for the general population. Environmental air sampling data are shown in Table 1 and the continuous sampling points in Figure 1.

Continuous sampling of the surface waterways adjacent to the plant revealed no instance where the uranium concentration exceeded the maximum permissible concentration specified for water (MPC_w).^{*} The average activity of natural uranium materials in the Clinch River reflecting the effects of all of the Oak Ridge plants was only about 0.01% of the MPC_w . Sampling data are shown in Table 2 and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements at five locations surrounding the ORGDP area averaged 0.02 mr/hour. This approximates the average background levels obtained throughout the United States by the U.S. Public Health Service Radiation Surveillance Network, employing similar methods and detection instruments.

^{*} Manual Chapter AEC-0524, Annex 1, Table 2, "Concentrations in Air and Water Above Natural Background."

TABLE 1
ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

| January-June 1964 | | | | | | | |
|--|-----------------------------|---------------------------|--|-----------|--------------|---|--|
| <u>Distance from Center of Plant</u> | <u>Type of Analysis</u> | <u>No. of Samples</u> | <u>Units of 10⁻¹³ μc/cc</u> | | | | <u>Average % MPC_a**</u> |
| | | | <u>Direction from Plant</u> | | <u>Total</u> | <u>Max. Permissible Conc. (MPC_a)</u> | |
| | | | <u>N</u> | <u>NE</u> | | | |
| 5-Mile Radius* | Gross Alpha | 1595 | < 1 | < 1 | < 1 | 20.0 | 17.5 |
| | | | 3.0 | 4.5 | 4.0 | 3.5 | |
| | | | 72 | 10 | 30 | 72 | |
| | | | | | | | |

* Normal Sampling Frequency: Continuous; averaged over 8 hours.

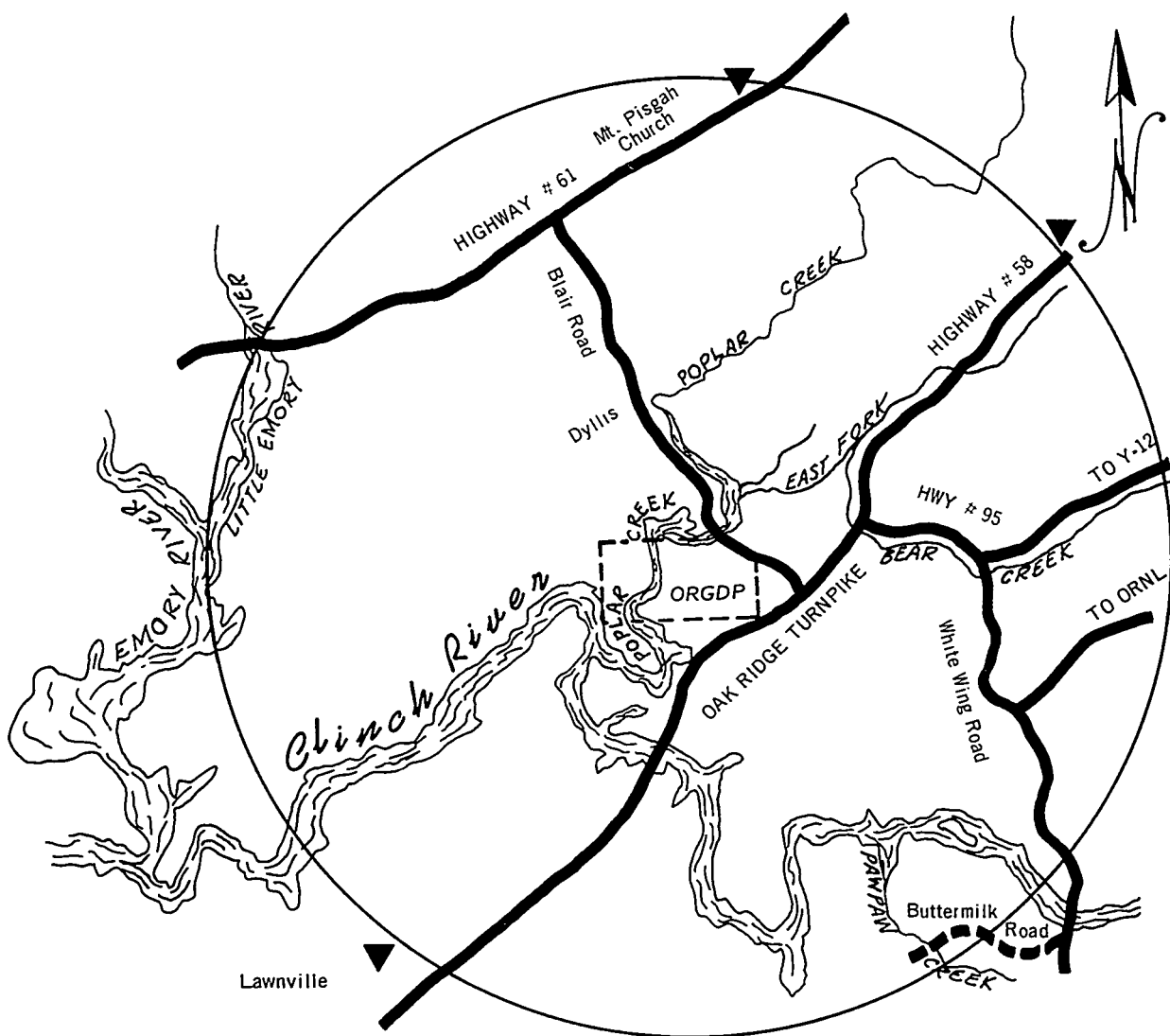
** Maximum permissible concentrations for continuous exposure of the general population.

TABLE 2
ENVIRONMENTAL SAMPLING - LOCAL STREAMS
OAK RIDGE GASEOUS DIFFUSION PLANT

| January-June 1964 | | | | | | | |
|-----------------------|-----------------------|-------------------|-------------------------------------|------|---|------|----------------------------------|
| Location of Point* | Type of Analysis | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | | Average % MPC _w ** |
| | | | Plant Experience | | Max. Permissible Conc. (MPC _w) | | |
| | | | Low | High | | Av. | |
| Upstream | Uranium Concentration | 24 | 0 | 0.5 | 0.1 | 2000 | < 0.01 |
| Downstream | Uranium Concentration | 24 | 0 | 0.8 | 0.1 | 2000 | < 0.01 |

* Normal Sampling Frequency: Continuous; composited over one week.

** Maximum permissible concentrations for continuous exposure to the general population.



SAMPLING POINTS OF OUTSIDE ENVIRONS - ORGDP
AIR

▼ Sampling Location - Five Miles from Plant

FIGURE 1

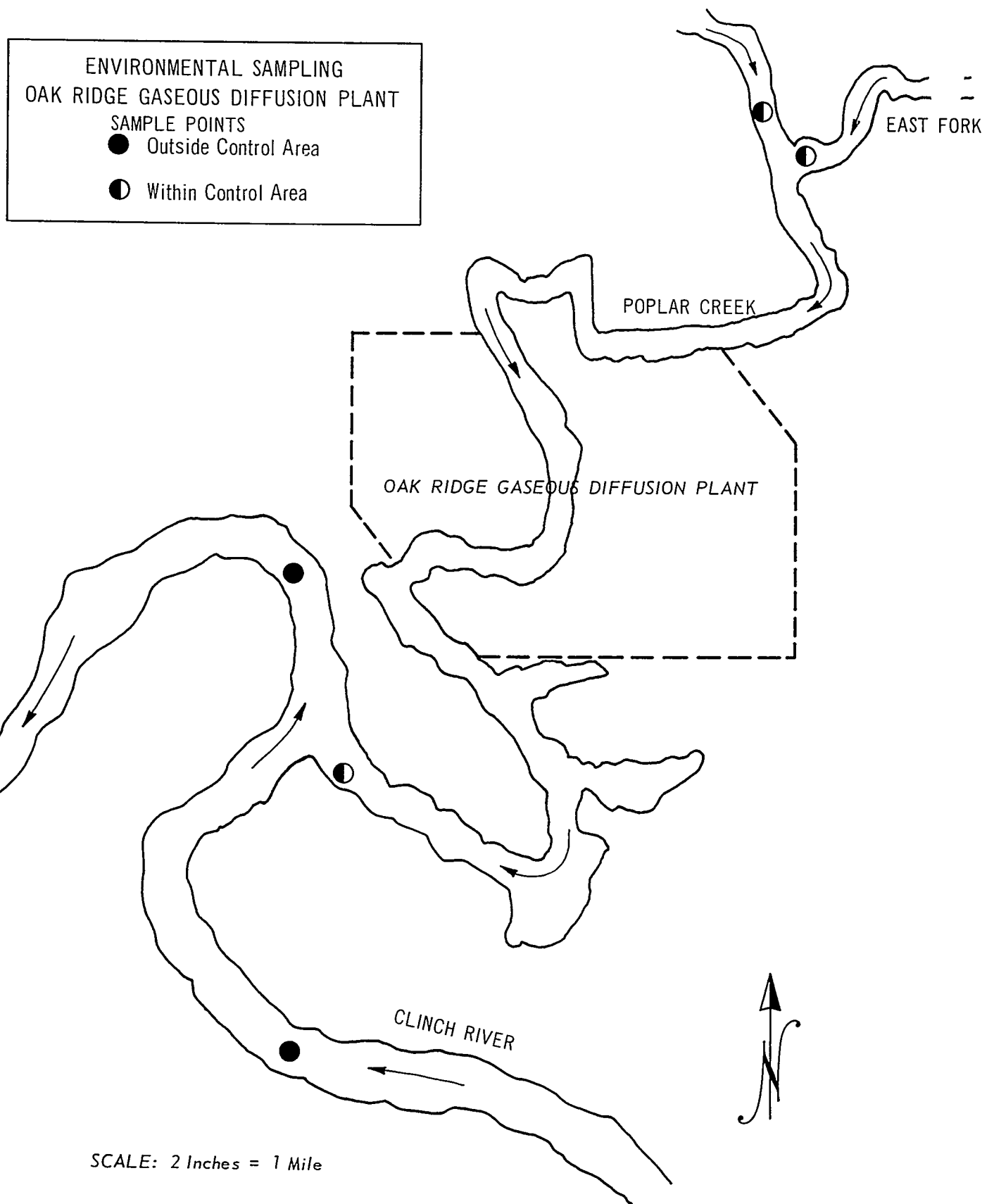


FIGURE 2



UNION CARBIDE CORPORATION
NUCLEAR DIVISION
P. O. BOX P, OAK RIDGE, TENNESSEE 37831

Safety and Health
Physics
1964 MAR 20 PM 3:46

February 27, 1964

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee


Attention: Mr. S. R. Sapirie, Manager
Oak Ridge Operations

Gentlemen:

Dissemination to the Public of Data
on Environmental Levels of Radioactivity

As requested, we are enclosing eighty copies of the report for the second half of 1963 on Environmental Levels of Radioactivity for the Oak Ridge Area.

Very truly yours,


C. E. Larson
Vice President

CEL:JAS:dg

Enclosures

cc w/encl.: F. R. Bruce
D. M. Davis (10)
W. H. Jordan
K. Z. Morgan
J. P. Murray (4)
ORGDP, Safety and Health
Department (2)
J. A. Swartout (2)

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

(Report for Period, July - December, 1963)

Compiled by the

Applied Health Physics Section

Health Physics Division

OAK RIDGE NATIONAL LABORATORY

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to trenches located in the Conasauga shale formation. (The use of pits for disposal of liquid waste was discontinued as of November, 1962.) Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

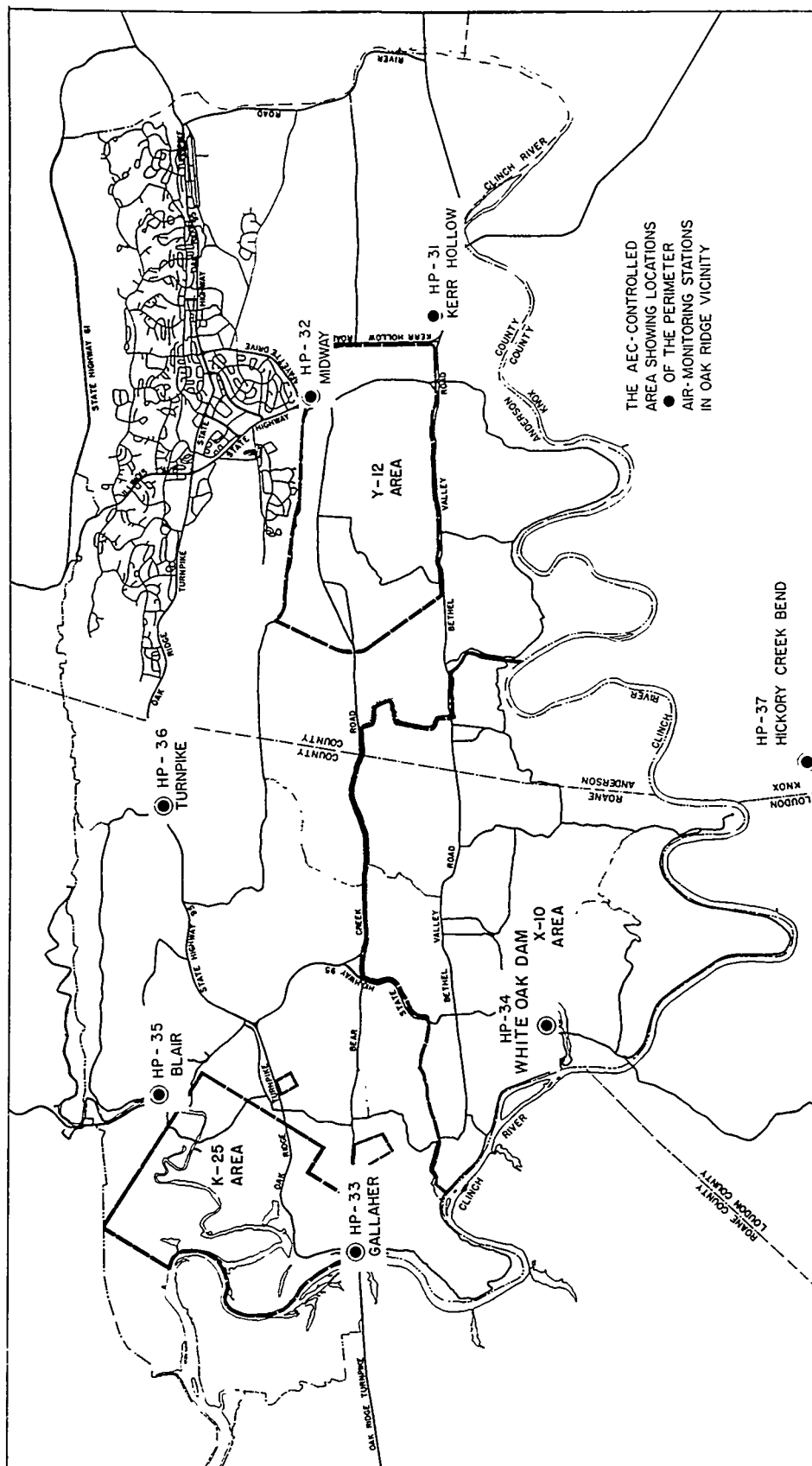
Air Monitoring

Atmospheric contamination by long-lived fission products and by fallout occurring in the general environment of East Tennessee is monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provide data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of seven stations encircling the Oak Ridge Area at distances of from 12 to 75 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c}/\text{cc}$ of air sampled.

Atmospheric contamination by alpha-emitting materials, interpreted as uranium, is determined by taking continuous air samples at three locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

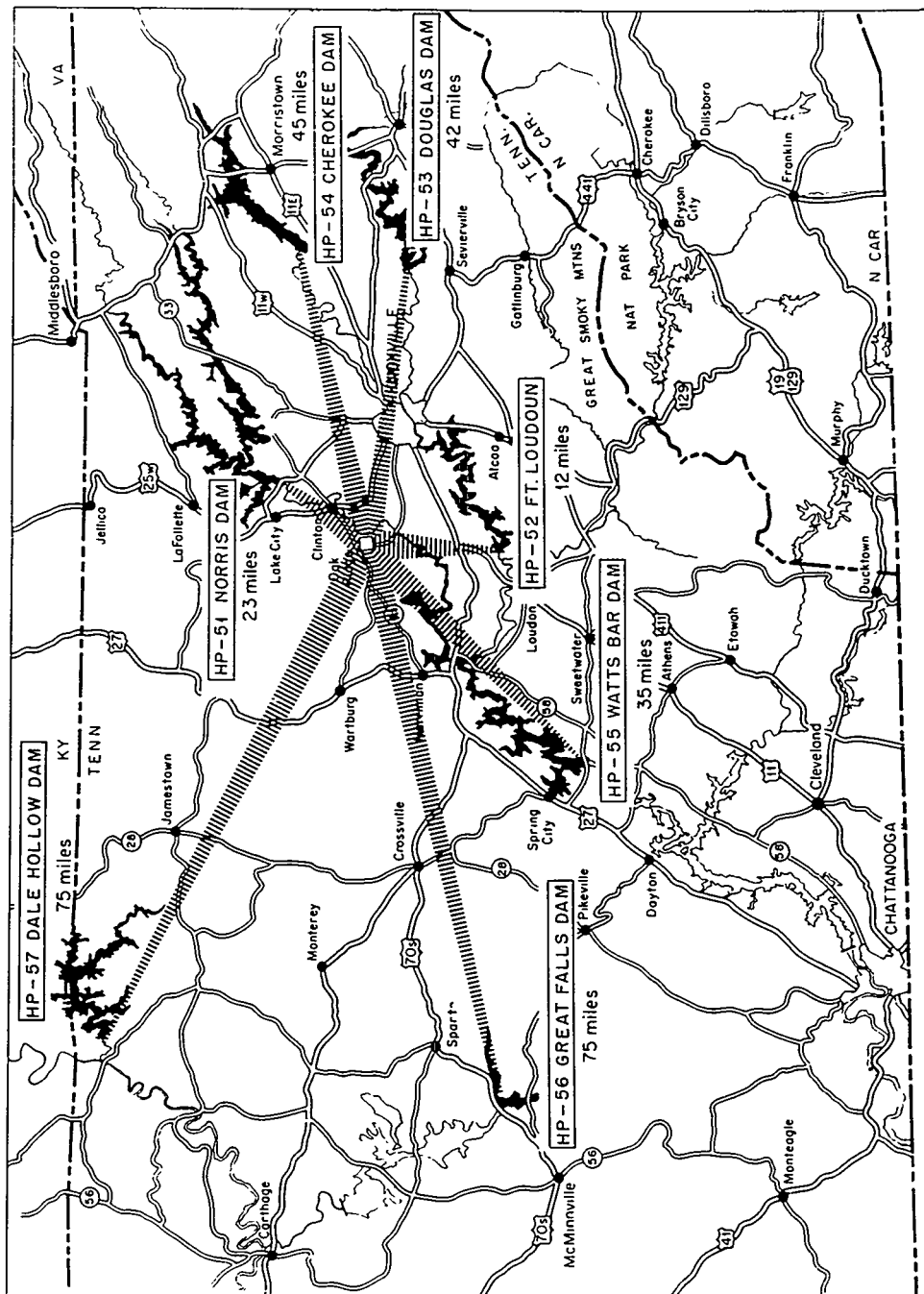
Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant



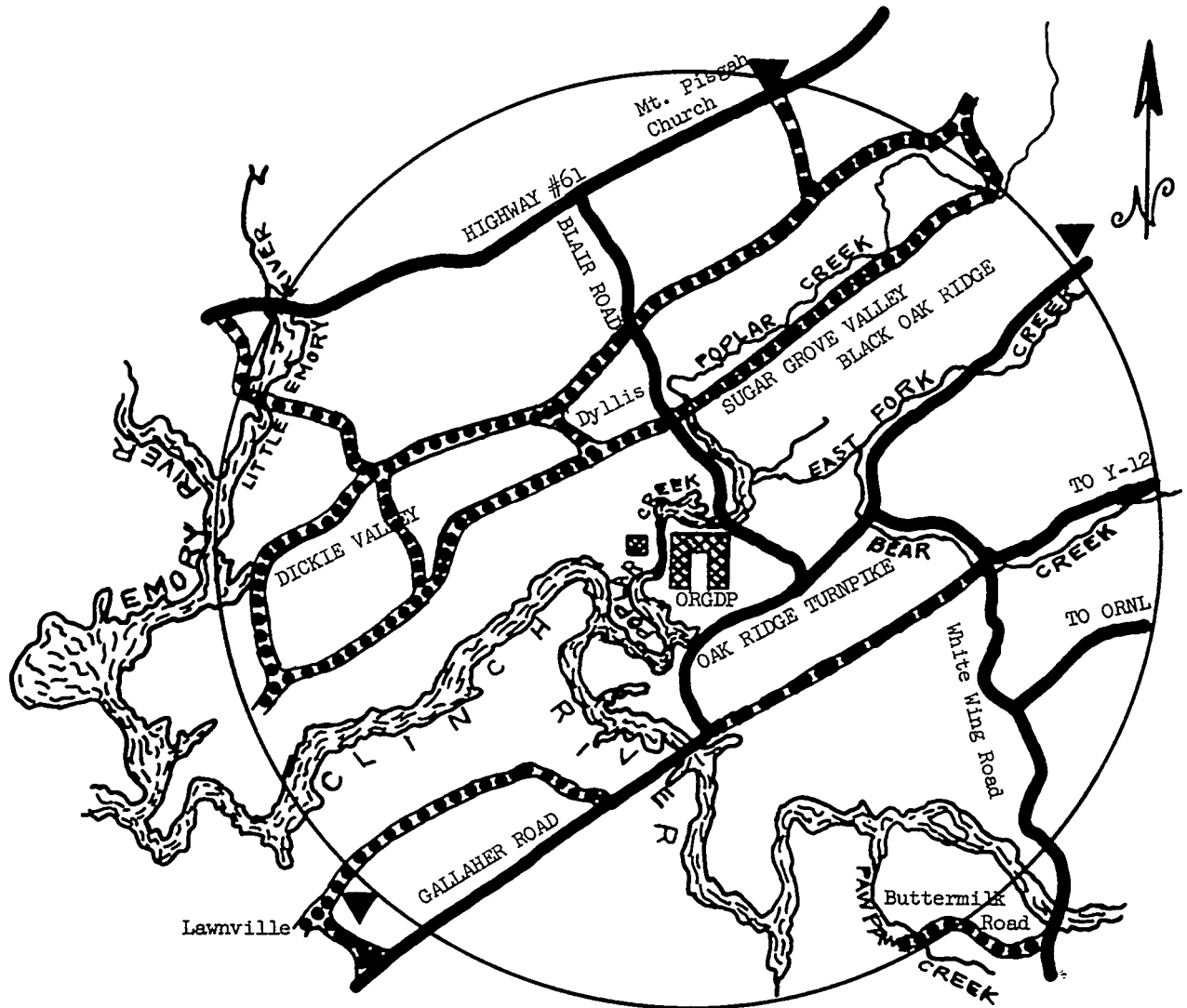
STATION SITES FOR PERIMETER AIR MONITORING SYSTEM

Figure 1



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

AIR

▼ Sampling Location - Five Miles from Plant

Figure 3

and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as specified by AEC Manual, Chapter 0524. The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

Analyses are made of the effluent for the long-lived radionuclides only since cooling time and hold-up time in the waste effluent system is such that short-lived radionuclides are not present. The concentrations of those isotopes present in significant amounts are determined by analysis. A weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as specified by AEC Manual, Chapter 0524.¹ The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

Gamma Measurements

External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Müller tube at a distance of three feet above the ground, and the results are tabulated in terms of mR/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the second half of 1963 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

¹AEC Manual, Chapter 0524, Appendix, Annex 1, Table II.



Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R2

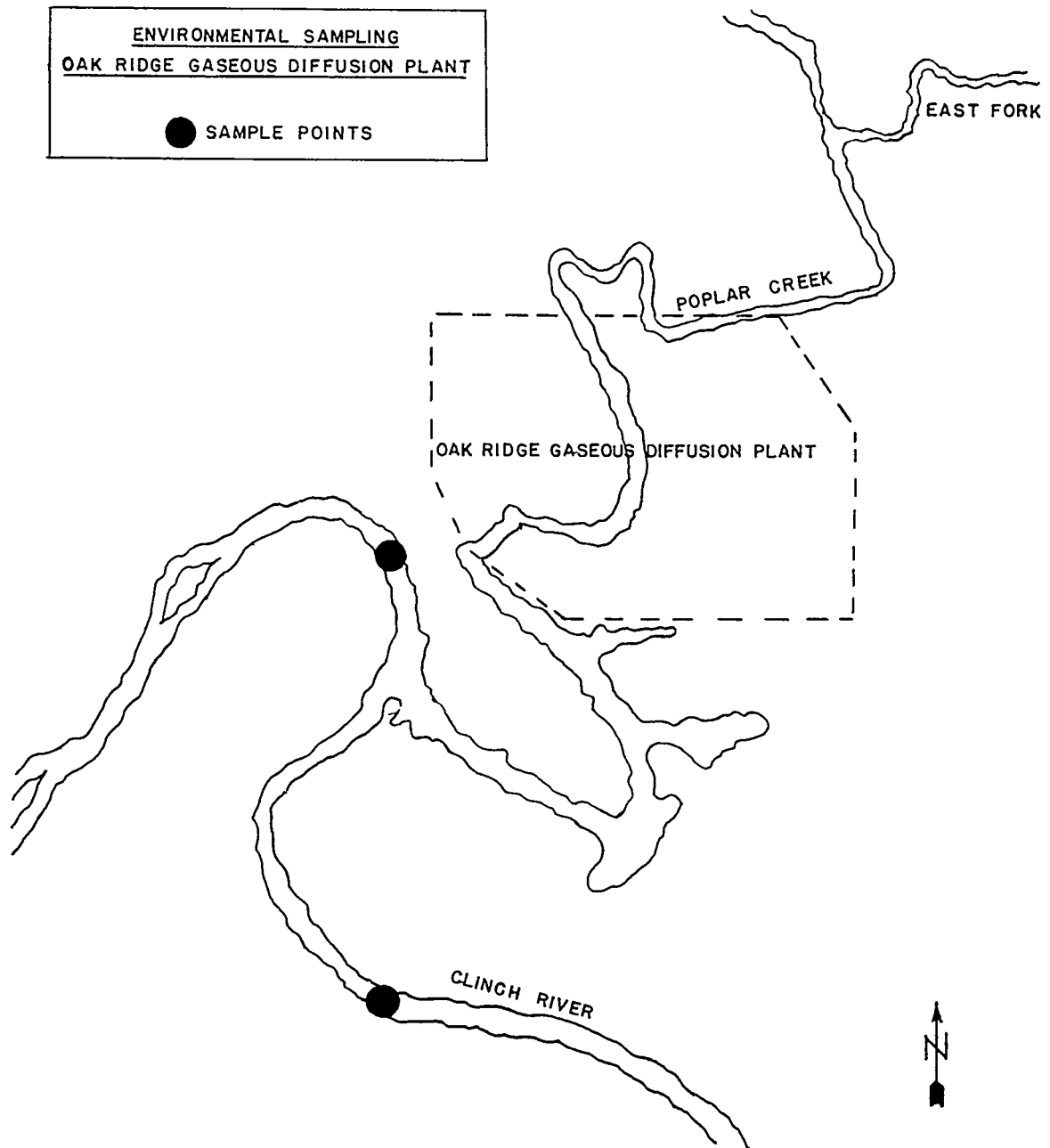


Figure 5

The average air contamination levels for gross beta activity, as shown by the continuous air monitoring filter data for the immediate and remote environs of the plants, were 2.0% and 2.4% respectively, of the maximum permissible concentration for populations in the neighborhood of a controlled area. These values are approximately a factor of three lower than those of the first half of 1963 but are not significantly different from the average of those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network for the period July through November, 1963.

The average air-borne alpha activity in the environs of the ORGDP, five miles from ORGDP, was 20% of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of most of the wastes, and at Mile 4.5, near Kingston, Tennessee, were 8.6×10^{-8} $\mu\text{c/ml}$ and 4.4×10^{-8} $\mu\text{c/ml}$ respectively. These values are 3.3% and 4.0% of the weighted average maximum permissible concentration $(\text{MPC})_w$. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 5.9×10^{-11} $\mu\text{c/ml}$ which is approximately 0.002% of the weighted average $(\text{MPC})_w$ value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all Oak Ridge Plants, was 0.01% of the $(\text{MPC})_w$ for uranium.

Fall-out from weapons tests continues to result in increased concentrations of Sr^{90} and Ce^{144} in Clinch River water, Table IV, CRM 41.5, upstream from the point of entry of the wastes into the river.

External gamma radiation in the Oak Ridge Area averaged 0.023 mR/hr.

Conclusion

The air and ground contamination found in both the immediate and remote environs of Oak Ridge is due primarily to fall-out from sources other than local plant operations. From analysis of the data presented, it may be concluded that the Oak Ridge Operations contributed little to air or ground contamination in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes from local operations, the resulting concentrations in the river are well below the maximum permissible concentration for populations residing in the neighborhood of a controlled area.

TABLE I

CONTINUOUS AIR MONITORING DATA

Long-Lived Gross Beta Activity of
Particulates in AirJuly - December, 1963

| Station Number | Location | Number of Samples Taken | Units of 10-13 $\mu\text{c/cc}$ | | | % of (MPC) _a ^c |
|---------------------------|--------------------|----------------------------|---------------------------------|----------------------|---------|---|
| | | | Maximum ^a | Minimum ^b | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-31 | Kerr Hollow Gate | 26 | 68 | 5 | 22 | 2.2 |
| HP-32 | Midway Gate | 26 | 69 | 5 | 23 | 2.3 |
| HP-33 | Gallaher Gate | 26 | 49 | 3 | 16 | 1.6 |
| HP-34 | White Oak Dam | 26 | 57 | 3 | 18 | 1.8 |
| HP-35 | Blair Gate | 26 | 69 | 4 | 22 | 2.2 |
| HP-36 | Turnpike Gate | 180 ^d | 66 | 4 | 22 | 2.2 |
| HP-37 | Hickory Creek Bend | 26 | 61 | 4 | 20 | 2.0 |
| Average | | | | | 20 | 2.0 |
| <u>Remote Stations</u> | | | | | | |
| HP-51 | Norris Dam | 26 | 59 | 5 | 23 | 2.3 |
| HP-52 | Loudoun Dam | 25 | 91 | 4 | 27 | 2.7 |
| HP-53 | Douglas Dam | 25 | 78 | 4 | 24 | 2.4 |
| HP-54 | Cherokee Dam | 26 | 74 | 6 | 27 | 2.7 |
| HP-55 | Watts Bar Dam | 26 | 72 | 5 | 23 | 2.3 |
| HP-56 | Great Falls Dam | 26 | 75 | 5 | 24 | 2.4 |
| HP-57 | Dale Hollow Dam | 26 | 56 | 5 | 22 | 2.2 |
| Average | | | | | 24 | 2.4 |

^aMaximum weekly average concentration.^bMinimum weekly average concentration.^c(MPC)_a is taken to be 10^{-10} $\mu\text{c/cc}$ as specified in AEC Manual, Chapter 0524, Appendix, Annex 1, Table II.^dSamples collected on daily schedule beginning 5/7/62. Maximum and minimum daily average concentrations were 90×10^{-13} $\mu\text{c/cc}$ and 3.0×10^{-13} $\mu\text{c/cc}$ respectively.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA

July - December, 1963

| Distance from Center of Plant | Type of Analyses | No. of Samples* | Units of 10-13 $\mu\text{c/cc}$ | | | |
|----------------------------------|---------------------|--------------------|---------------------------------|------------|------------|--------------------|
| | | | Direction from Plant | | | (MPC) _a |
| | | | North | North East | South West | |
| 5 Mile Radius | Gross Alpha | 1418 | 2.5 | 5.0 | 2.5 | 4.0 |
| | | | | | | 20 |

* Normal Sampling Frequency: Continuous, averaged over 8 hours.

TABLE III
CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

July - December, 1963

| Number of Samples Taken | Units of $10^{-7} \mu\text{c/cc}$ | | | % of (MPC) |
|----------------------------|-----------------------------------|----------------------|---------|------------|
| | Maximum ^a | Minimum ^b | Average | |
| 182 | 4.6 | 0.08 | 0.86 | 3.3 |

^aMaximum weekly average.

^bMinimum weekly average.

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

July - December, 1963

| Location | Units of 10^{-8} $\mu\text{c/ml}$ | | | | | | | % of | |
|-----------------------|-------------------------------------|-------------------|-------------------|-----------------------|------------------|------------------------------------|-----------------------|---------------------------------|--------------------|
| | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | Zr ⁹⁵ -Nb ⁹⁵ | Average Beta Activity | (MPC) _w ^a | (MPC) _w |
| Mi. 41.5 ^b | 0.15 | 0.13 | 0.04 | 0.50 | 0.02 | 0.05 | 0.89 | 56 | 1.6 |
| Mi. 20.8 ^c | 0.14 | 0.01 | 0.13 | 2.8 | 0.21 | 0.04 | 8.6 | 260 | 3.3 |
| Mi. 4.5 | 0.36 | 0.16 | 0.16 | 3.4 | 0.23 | 0.07 | 4.4 | 110 | 4.0 |

^aWeighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides specified by AEC Manual, Chapter 0524, Appendix, Annex 1, Table II.

^bSampling station moved from Clinch River Mile 33.2 to Mile 41.5 about January 1, 1962.

^cValues given for this location are calculated values based on levels of waste released and the dilution afforded by the river; they do not include amounts of radioactive material (e.g., fall-out) that may enter the river upstream from CRM 20.8.

TABLE V
URANIUM CONCENTRATION IN THE CLINCH RIVER

July - December, 1963

| Sampling Point | Type of Analyses Made | No. of Samples* | Units of 10^{-8} $\mu\text{c/cc}$ | | | $(\text{MPC})_w$ | % $(\text{MPC})_w$ |
|-----------------------|-----------------------|-----------------|-------------------------------------|---------|---------|------------------|--------------------|
| | | | Maximum | Minimum | Average | | |
| Upstream from ORGDP | Uranium Concentration | 24 | 5.6 | 0 | 0.8 | 2000 | 0.04 |
| Downstream from ORGDP | Uranium Concentration | 24 | 1.5 | 0 | 0.2 | 2000 | 0.01 |

*Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS

mR/hr

July - December, 1963

| Station Number | Location | July | Aug. | Sept. | Oct. | Nov. | Dec. | Average |
|----------------|-------------------------|-------|-------|-------|-------|-------|-------|---------|
| 1 | Solway Gate | 0.038 | 0.040 | 0.017 | 0.023 | 0.024 | 0.017 | 0.026 |
| 2 | Y-12 East Portal | 0.025 | 0.036 | 0.023 | 0.022 | 0.018 | 0.014 | 0.023 |
| 3 | Newcomb Road, Oak Ridge | 0.036 | 0.034 | 0.015 | 0.018 | 0.014 | 0.014 | 0.022 |
| 4 | Gallaher Gate | 0.042 | 0.043 | 0.020 | 0.023 | 0.019 | 0.018 | 0.028 |
| 5 | White Wing Gate | 0.017 | 0.022 | 0.014 | 0.014 | 0.013 | 0.012 | 0.015 |
| Average | | 0.031 | 0.035 | 0.018 | 0.020 | 0.018 | 0.015 | 0.023 |

Note: These readings were taken with a calibrated Geiger-Muller tube at a distance of three feet above the ground.

The background in the Oak Ridge area in 1943 was determined to be approximately 0.012 mR/hr.

**UNION
CARBIDE**

INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name) Dr. K. Z. Morgan
Company
Location ORNL

Date January 16, 1964

Originating Dept.

Answering letter date

Copy to Mr. K. W. Bahler
Mr. A. F. Becher
Mr. J. P. Murray
Health Physics File - RC ✓

Subject News Release on Environmental
Surveys

Attached are data for the semiannual news release, as requested by the AEC-CRO,
covering environmental surveys made by our plant forces at off-plant locations
during the second half of CY-1963.


R. G. Jordan

RGJ:ah

Attachment

1964 JAN 17 PM 10:16

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JULY THRU DECEMBER, 1963

The results of sampling of the environs of the Oak Ridge Gaseous Diffusion Plant during the second half of 1963 revealed that the amount of uranium in the surface waterways and in the air as far as five miles from the plant area is not significantly different from the normal background values established for this region.

The average air-borne alpha activity at the three five-mile sampling stations continued to be a fraction of the maximum permissible concentration for the general population. Environmental air sampling data are shown in Table 1 and the continuous sampling points in Figure 1.

Continuous sampling of the surface waterways adjacent to the plant revealed no instance where the uranium concentration exceeded the maximum permissible concentration specified for water (MPC_w).^{*} The average activity of natural uranium materials in the Clinch River reflecting the effects of all of the Oak Ridge plants was 0.01% of the MPC_w . Sampling data are shown in Table 2 and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements at five locations surrounding the ORGDP area averaged 0.04 mr/hour. This approximates the average background levels obtained throughout the United States by the U.S. Public Health Service Radiation Surveillance Network, employing similar methods and detection instruments.

^{*} Manual Chapter AEC-0524, Annex 1, Table 2, "Concentrations in Air and Water Above Natural Background."

January 14, 1964

TABLE 1

ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

July-December 1963

| Distance from Center of Plant | Type of Analysis | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | | Average % MPC _a ** |
|----------------------------------|---------------------|-------------------|--------------------------------------|------|-------|---|----------------------------------|
| | | | Direction from Plant | | Total | Max. Permissible Conc. (MPC _a) | |
| | | | N | NE | SW | | |
| 5-mile Radius* | Gross | 1418 | <1 | <1 | <1 | <1 | 20.0 |
| | Alpha | | 2.5 | 5.0 | 2.5 | 4.0 | |
| | | | Max. 10.5 | 27.0 | 40.5 | 40.5 | 20.0 |

* Normal Sampling Frequency: Continuous; averaged over 8 hours.

** Maximum permissible concentrations for continuous exposure of the general population.

TABLE 2

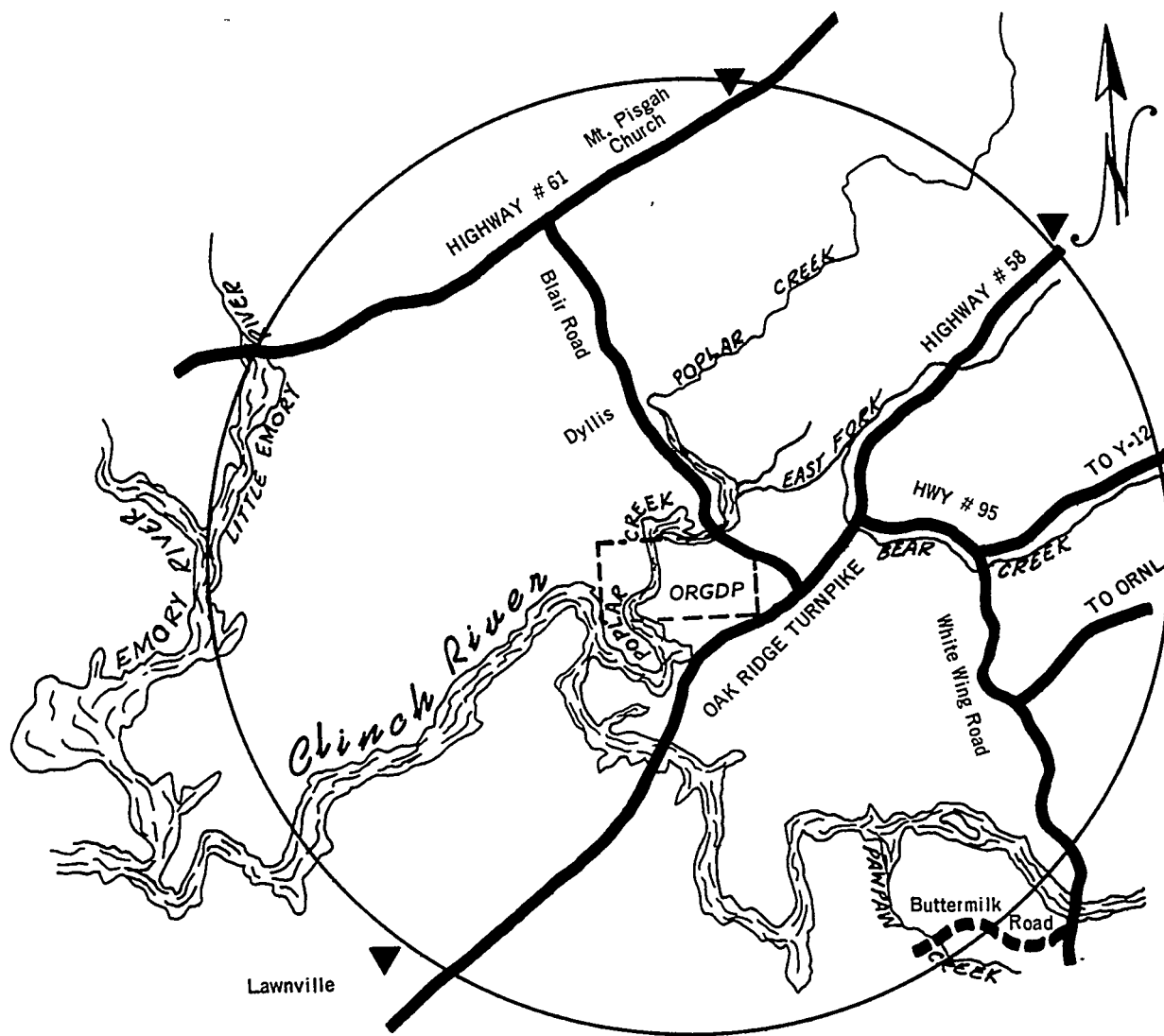
ENVIRONMENTAL SAMPLING - LOCAL STREAMS
OAK RIDGE GASEOUS DIFFUSION PLANT

July-December 1963

| Location of Point* | Type of Analysis | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | | Average % MPC _w ** |
|-----------------------|-----------------------|-------------------|-------------------------------------|------|---|------|----------------------------------|
| | | | Plant Experience | | Max. Permissible Conc. (MPC _w) | | |
| | | | Low | High | Av. | | |
| Upstream | Uranium Concentration | 24 | 0 | 5.6 | 0.8 | 2000 | 0.04 |
| Downstream | Uranium Concentration | 24 | 0 | 1.5 | 0.2 | 2000 | 0.01 |

* Normal Sampling Frequency: Continuous; composited over one week.

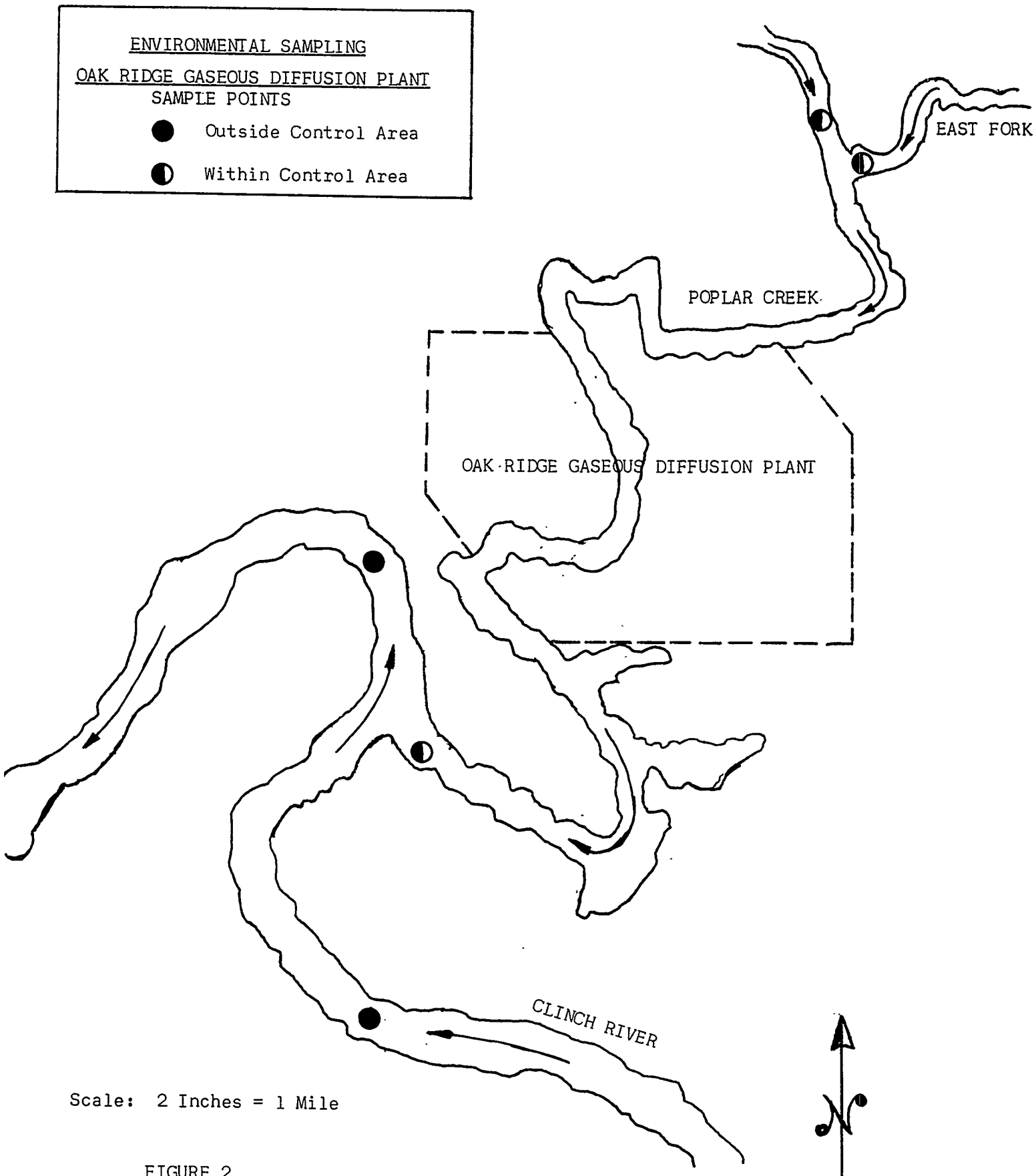
** Maximum permissible concentrations for continuous exposure of the general population.



SAMPLING POINTS OF OUTSIDE ENVIRONS - ORGDP
AIR

▼ Sampling Location - Five Miles from Plant

FIGURE 1



UNION CARBIDE NUCLEAR COMPANY • DIVISION OF



CORPORATION

POST OFFICE BOX P. OAK RIDGE, TENNESSEE

September 13, 1963

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie, Manager
Oak Ridge Operations

Gentlemen:

Dissemination to the Public of Data
on Environmental Levels of Radioactivity

As requested, we are enclosing eighty copies of the report for the first half of 1963 on Environmental Levels of Radioactivity for the Oak Ridge Area.

Very truly yours,

C. E. Larson
Vice President

CEL:JAS:dw

Enclosures

cc w/encl.: F. R. Bruce
D. M. Davis (10)
W. H. Jordan
K. Z. Morgan
J. P. Murray (4)
ORGDP, Safety and Health
Department (2)
J. A. Swartout (2)

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

(Report for Period, January - June, 1963)

Compiled by the

Applied Health Physics Section

Health Physics Division

OAK RIDGE NATIONAL LABORATORY

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to trenches located in the Conasauga shale formation. (The use of pits for disposal of liquid waste was discontinued as of November, 1962.) Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

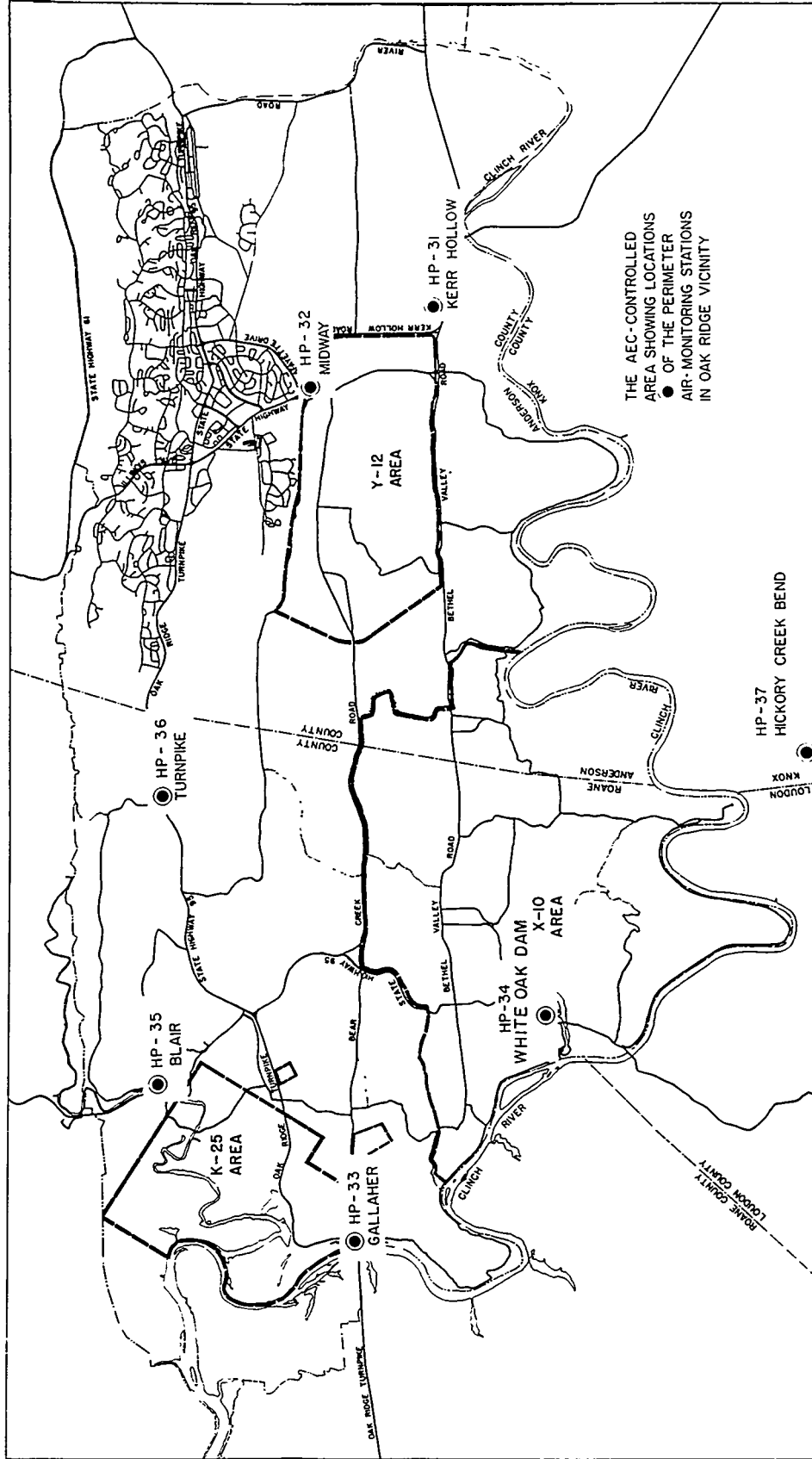
Air Monitoring

Atmospheric contamination by long-lived fission products and by fallout occurring in the general environment of East Tennessee is monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provide data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of seven stations encircling the Oak Ridge Area at distances of from 12 to 75 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c/cc}$ of air sampled.

Atmospheric contamination by alpha-emitting materials, interpreted as uranium, is determined by taking continuous air samples at five locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

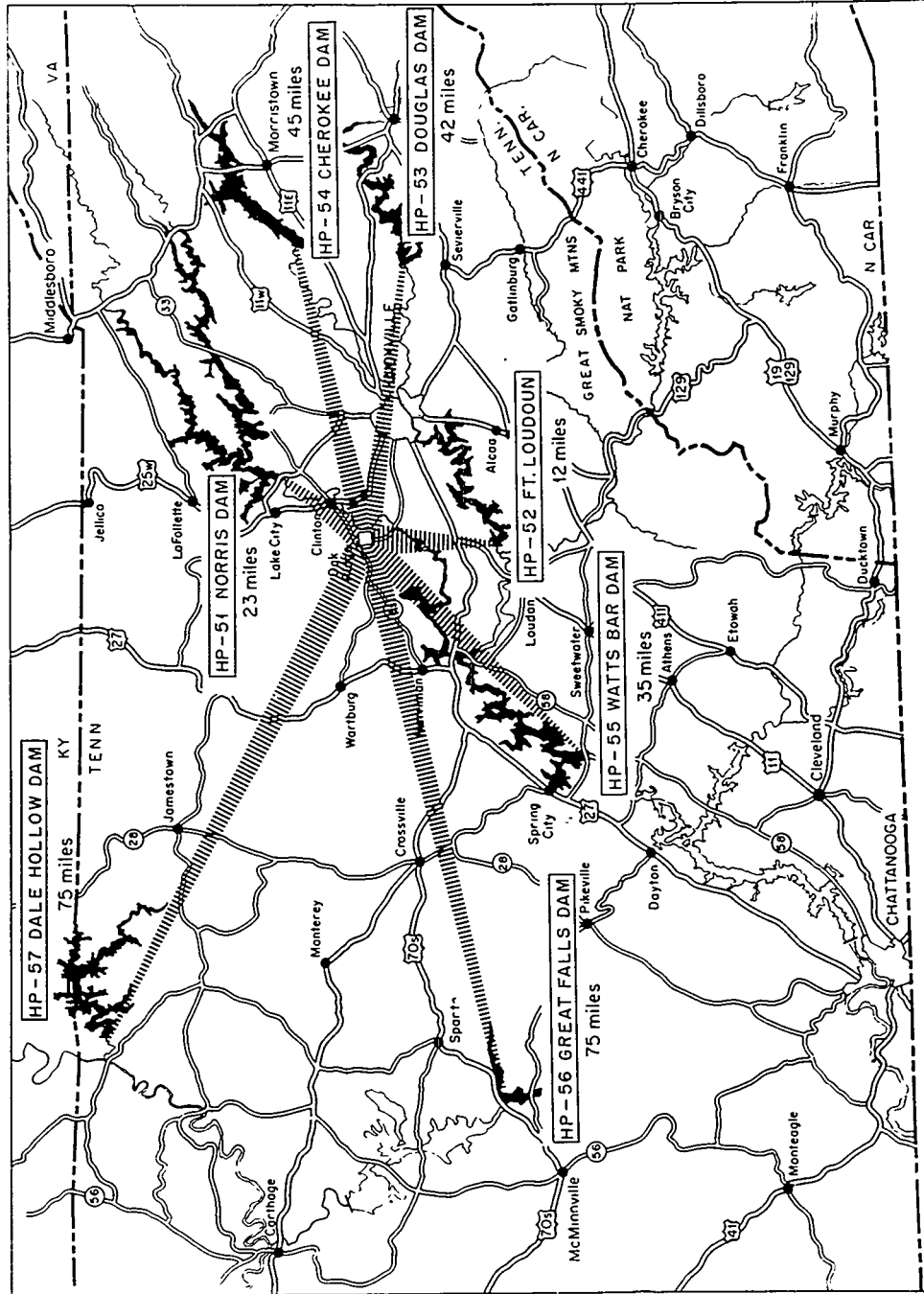
Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant



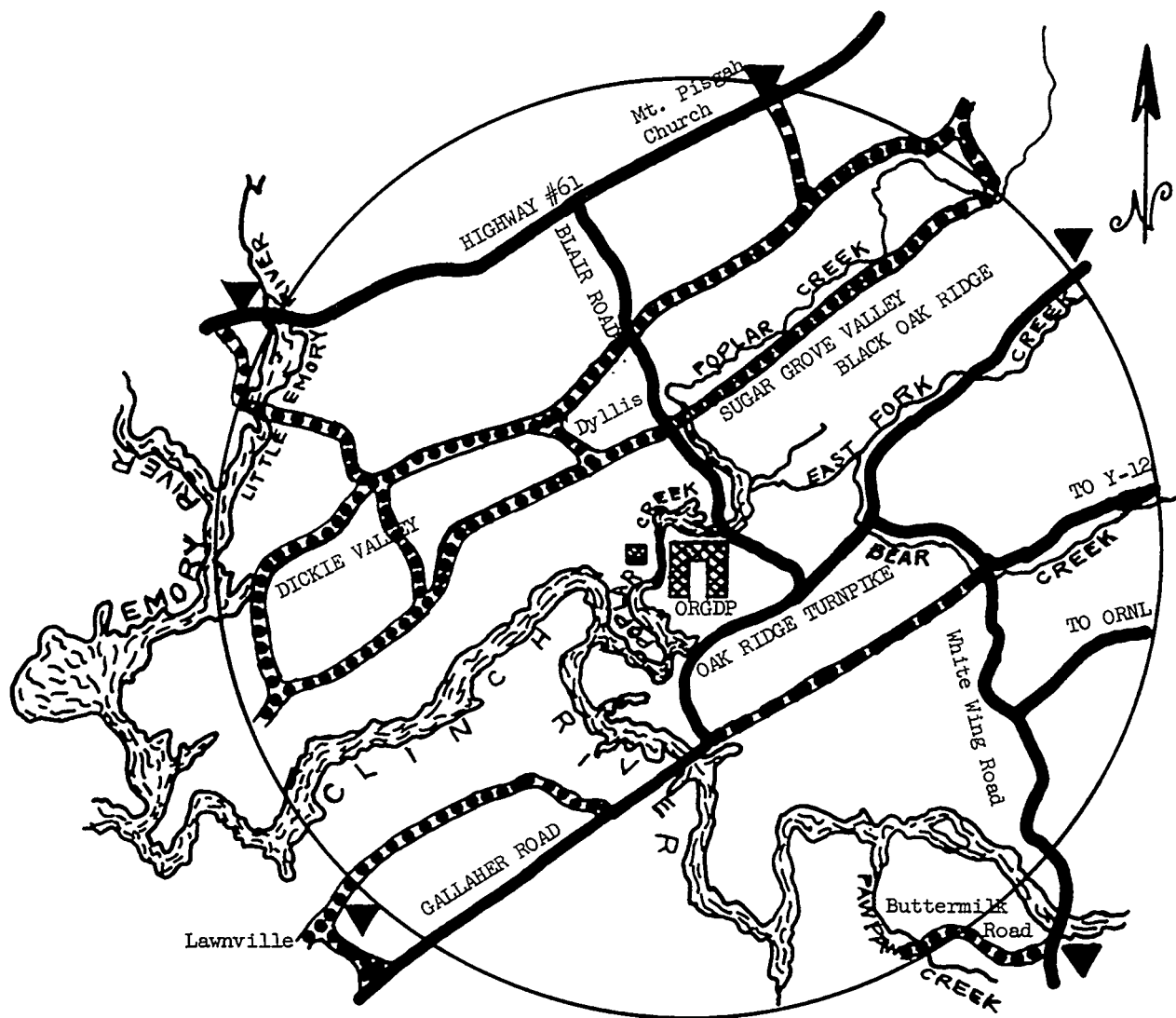
STATION SITES FOR PERIMETER AIR MONITORING SYSTEM

Figure 1



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

AIR



Sampling Location - Five Miles from Plant

Figure 3

and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

Analyses are made of the effluent for the long-lived radionuclides only since cooling time and hold-up time in the waste effluent system is such that short-lived radionuclides are not present. The concentrations of those isotopes present in significant amounts are determined by analysis. A weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

Gamma Measurements

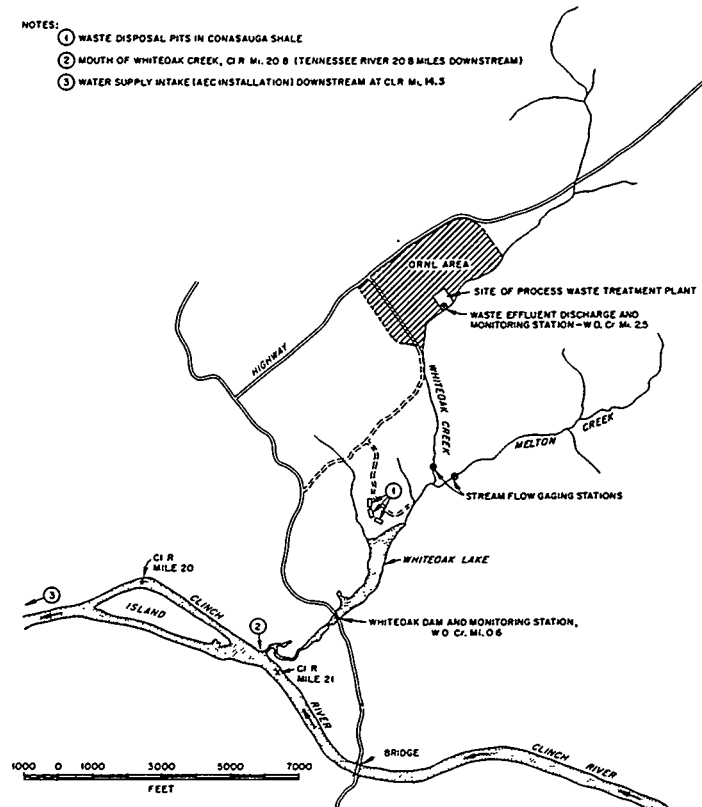
External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Müller tube at a distance of three feet above the ground, and the results are tabulated in terms of mR/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the first half of 1963 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

The average air contamination levels for gross beta activity, as shown by the continuous air monitoring filter data for the immediate and remote environs of the plants, were 6.0% and 6.3% respectively, of the maximum permissible concentration for populations in the neighborhood of

UNCLASSIFIED
ORNL-LR-DWG 28405R1



LOCATION SKETCH MAP
ORNL AREA SURFACE DRAINAGE

Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 48222R1

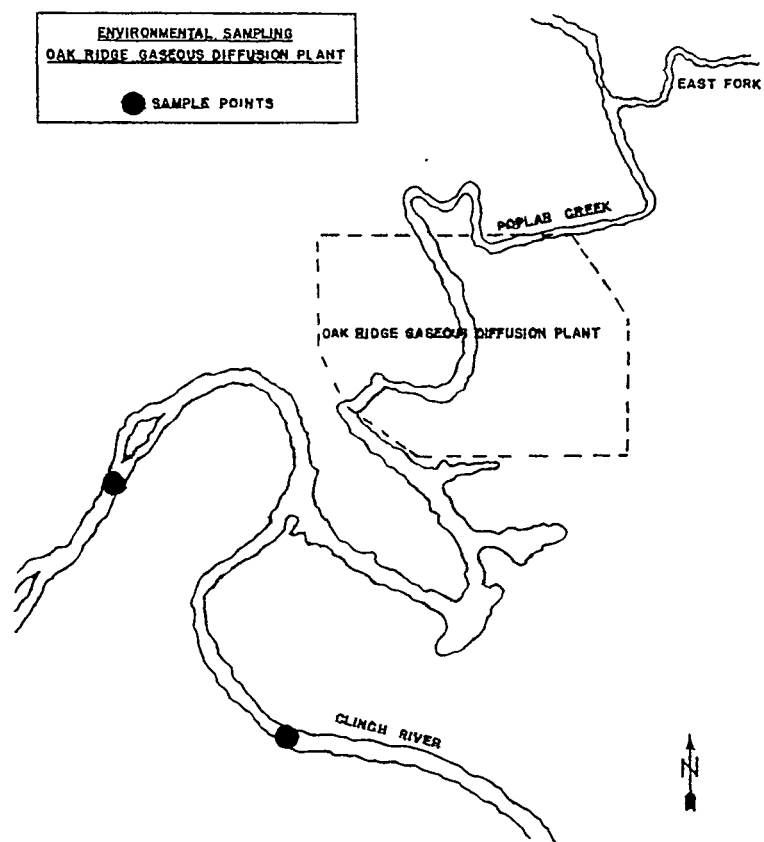


Figure 5

a controlled area. Although these values are approximately two times higher than those for the last half of 1962, they are no greater than the average of those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network for the period January through May, 1963.

The average air-borne alpha activity in the environs of the ORGDP, five miles from ORGDP, was 11% of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of most of the wastes, and at Mile 4.5, near Kingston, Tennessee, were 2.3×10^{-7} $\mu\text{c/ml}$ and 1.5×10^{-7} $\mu\text{c/ml}$ respectively. These values are 5.6% and 3.4% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 0.94×10^{-11} $\mu\text{c/ml}$ which is approximately 0.0002% of the weighted average $(\text{MPC})_w$ value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all Oak Ridge Plants, was 0.01% of the $(\text{MPC})_w$ for uranium.

Fall-out from weapons tests continues to result in increased concentrations of Sr^{90} , Ce^{144} , and $\text{Zr}^{95}\text{-Nb}^{95}$ in Clinch River water, Table IV, CRM 41.5, upstream from the point of entry of the wastes into the river.

External gamma radiation in the Oak Ridge Area averaged 0.028 mR/hr. This level is approximately the same as for the last half of 1962.

Conclusion

The air and ground contamination in both the immediate and remote environs of Oak Ridge is due predominantly to fall-out from sources other than local plant operations. From analysis of the data taken, it is concluded that the Oak Ridge Operations contributed little to the air or ground contamination found in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes from local operations, the resulting concentrations in the river are well below the maximum permissible concentration recommended by the NCRP for populations in the neighborhood of an atomic energy installation.

TABLE I

CONTINUOUS AIR MONITORING DATA

Long-Lived Gross Beta Activity of
Particulates in AirJanuary - June, 1963

| Station Number | Location | Number of Samples Taken | Units of 10-13 $\mu\text{c/cc}$ | | | % of (MPC) _a ^c |
|---------------------------|--------------------|----------------------------|---------------------------------|----------------------|---------|---|
| | | | Maximum ^a | Minimum ^b | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-31 | Kerr Hollow Gate | 26 | 99 | 29 | 58 | 5.8 |
| HP-32 | Midway Gate | 26 | 105 | 27 | 61 | 6.1 |
| HP-33 | Gallaher Gate | 26 | 99 | 28 | 56 | 5.6 |
| HP-34 | White Oak Dam | 26 | 106 | 30 | 57 | 5.7 |
| HP-35 | Blair Gate | 26 | 131 | 31 | 67 | 6.7 |
| HP-36 | Turnpike Gate | 181 ^d | 108 | 35 | 64 | 6.4 |
| HP-37 | Hickory Creek Bend | 26 | 85 | 29 | 56 | 5.6 |
| Average | | | | | 60 | 6.0 |
| <u>Remote Stations</u> | | | | | | |
| HP-51 | Norris Dam | 26 | 114 | 35 | 57 | 5.7 |
| HP-52 | Loudoun Dam | 26 | 107 | 37 | 66 | 6.6 |
| HP-53 | Douglas Dam | 26 | 107 | 39 | 65 | 6.5 |
| HP-54 | Cherokee Dam | 26 | 95 | 35 | 67 | 6.7 |
| HP-55 | Watts Bar Dam | 26 | 101 | 39 | 61 | 6.1 |
| HP-56 | Great Falls Dam | 25 | 99 | 45 | 63 | 6.3 |
| HP-57 | Dale Hollow Dam | 26 | 94 | 41 | 59 | 5.9 |
| Average | | | | | 63 | 6.3 |

^aMaximum weekly average concentration.^bMinimum weekly average concentration.^c(MPC)_a is taken to be 10^{-10} $\mu\text{c/cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.^dSamples collected on daily schedule beginning 5/7/62. Maximum and minimum daily average concentrations were 185×10^{-13} $\mu\text{c/cc}$ and 8.9×10^{-13} $\mu\text{c/cc}$ respectively.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA

January - June, 1963

| Distance from Center of Plant | Type of Analyses | No. of Samples* | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | |
|----------------------------------|---------------------|--------------------|--------------------------------------|------|-------|---------|--------------------|----------------------|
| | | | Direction from Plant | | | Average | (MPC) ^a | % (MPC) ^a |
| | | | North | East | South | West | | |
| 5-Mile Radius | Gross Alpha | 2346 | 1.7 | 1.7 | 2.3 | 3.5 | 2.2 | 11 |

*Normal Sampling Frequency: Continuous, averaged over 8 hours.

TABLE III
 CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
 IN THE CLINCH RIVER AT MILE 20.8

January - June, 1963

| Number of Samples Taken | Units of $10^{-7} \mu\text{c/cc}$ | | | % of $(\text{MPC})_w$ |
|----------------------------|-----------------------------------|----------------------|---------|-----------------------|
| | Maximum ^a | Minimum ^b | Average | |
| 182 | 5.8 | 0.19 | 2.3 | 5.6 |

^aMaximum weekly average.

^bMinimum weekly average.

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

January - June, 1963

| Location | Units of 10^{-8} $\mu\text{c/ml}$ | | | | | | | Average Beta Activity | (MPC) _w ^a | % of (MPC) _w |
|-----------------------|-------------------------------------|-------------------|-------------------|-----------------------|------------------|------------------|------------------|--------------------------|---------------------------------|----------------------------|
| | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | Zr ⁹⁵ | Nb ⁹⁵ | | | |
| Mi. 41.5 ^b | 0.10 | 0.27 | 0.01 | 1.35 | * | 0.47 | 2.2 | 190 | 1.1 | 1.1 |
| Mi. 20.8 ^c | 0.14 | 0.02 | 0.03 | 7.7 | 0.31 | 0.03 | 23 | 410 | 5.6 | 5.6 |
| Mi. 4.5 | 0.21 | 0.38 | 0.29 | 13 | 0.72 | 0.72 | 15 | 440 | 3.4 | 3.4 |

^aWeighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in NCRP-Handbook 60 (published by NBS) for the occupational worker.

^bSampling station moved from Clinch River Mile 33.2 to Mile 41.5 about January 1, 1962.

^cValues given for this location are calculated values based on levels of waste released and the dilution afforded by the river; they do not include amounts of radioactive material (e.g., fall-out) that may enter the river upstream from CRM 20.8.

*None detected.

TABLE V
URANIUM CONCENTRATION IN THE CLINCH RIVER

January - June, 1963

| Sampling Point | Type of Analyses Made | No. of Samples* | Units of 10^{-8} $\mu\text{c}/\text{cc}$ | | | $\% \text{ (MPC)}_w$ |
|-----------------------|-----------------------|-----------------|--|---------|---------|----------------------|
| | | | Maximum | Minimum | Average | |
| Upstream from ORGDP | Uranium Concentration | 24 | 1.0 | 0 | 0.2 | 0.01 |
| Downstream from ORGDP | Uranium Concentration | 25 | 2.2 | 0 | 0.2 | 0.01 |

*Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS

mR/hr

January - June, 1963

| Station Number | Location | Jan. | Feb. | March | April | May | June | Average |
|----------------|-------------------------|-------|-------|-------|-------|-------|-------|---------|
| 1 | Solway Gate | 0.035 | 0.019 | 0.032 | 0.028 | 0.040 | 0.036 | 0.032 |
| 2 | Y-12 East Portal | 0.022 | 0.018 | 0.023 | 0.031 | -- | 0.035 | 0.026 |
| 3 | Newcomb Road, Oak Ridge | 0.025 | 0.015 | 0.029 | 0.025 | 0.038 | 0.034 | 0.028 |
| 4 | Gallaher Gate | 0.038 | 0.026 | 0.040 | 0.034 | -- | 0.038 | 0.035 |
| 5 | White Wing Gate | 0.017 | 0.017 | 0.018 | 0.017 | -- | 0.015 | 0.017 |
| Average | | 0.027 | 0.019 | 0.028 | 0.027 | 0.039 | 0.032 | 0.028 |

Note: These readings were taken with a calibrated Geiger-Müller tube at a distance of three feet above the ground.

The background in the Oak Ridge area in 1943 was determined to be approximately 0.012 mR/hr.



INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name) Dr. K. Z. Morgan
Company
Location ORNL

Date July 19, 1963

Originating Dept.

Answering letter date

Copy to Mr. K. W. Bahler
Mr. A. F. Becher
Mr. J. P. Murray
Health Physics File - RC

Subject News Release on Environmental
Surveys

Safety and Health
Physics

Attached are data for the semiannual news release as requested by the AEC-ORO,
covering environmental surveys made by our plant forces at off-plant locations
during the first half of CY-1963.

ORIGINAL SIGNED BY

R. G. JORDAN

R. G. Jordan

RGJ:mh

Attachment

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JANUARY THRU JUNE, 1963

The results of sampling of the environs of the Oak Ridge Gaseous Diffusion Plant during the first half of 1963 revealed that the amount of uranium in the surface waterways and in the air as far as five miles from the plant area is not significantly different from the normal background values established for this region.

The average air-borne alpha activity at the five-mile sampling stations continued to be less than one-half of the maximum permissible concentration for the general population. Environmental air sampling data are shown in Table 1 and the continuous sampling points in Figure 1.

Continuous sampling of the surface waterways adjacent to the plant revealed no instance where the uranium concentration exceeded the maximum permissible concentration specified for water (MPC_w).^{*} The average activity of natural uranium materials in the Clinch River reflecting the effects of all of the Oak Ridge plants was 0.03% of the MPC_w . Sampling data are shown in Table 2 and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements at five locations surrounding the ORGDP Area averaged 0.020 mr/hour. This approximates the average background levels obtained throughout the United States by the U. S. Public Health Service Radiation Surveillance Network, employing similar methods and detection instruments.

^{*} National Bureau of Standards Handbook No. 69, Maximum permissible concentrations in water for populations adjacent to AEC installations based on a 168-hour continuous exposure to natural uranium.

July 17, 1963

TABLE 1
ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

January-June 1963

| Distance from Center of Plant | Type of Analysis | No. of Samples | Units of 10 ⁻¹³ μc/cc | | | | | Average % MPC _a ** | |
|----------------------------------|---------------------|-------------------|----------------------------------|------|------|------|-------|----------------------------------|---|
| | | | Direction from Plant | | | | Total | | Max. Permissible Conc. (MPC _a) |
| | | | N | E | S | W | | | |
| 5-mile Radius* | Gross Alpha | 2346 | Min. | < 1 | < 1 | < 1 | < 1 | 6.7 | 32.8 |
| | | | Av. | 1.7 | 1.7 | 2.3 | 3.5 | | |
| | | | Max. | 11.4 | 12.5 | 15.6 | 13.5 | | |

* Normal Sampling Frequency: Continuous; averaged over 8 hours.

** Maximum permissible concentrations for continuous exposure of the general population.

TABLE 2
ENVIRONMENTAL SAMPLING - LOCAL STREAMS
OAK RIDGE GASEOUS DIFFUSION PLANT

January-June 1963

| Location of Point* | Type of Analysis | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | | Average % MPC _w ** |
|-----------------------|-----------------------|-------------------|-------------------------------------|------|---|-----|----------------------------------|
| | | | Plant Experience | | Max. Permissible Conc. (MPC _w) | | |
| | | | Low | High | | | |
| Upstream | Uranium Concentration | 24 | 0 | 1.0 | 0.2 | 667 | 0.03 |
| Downstream | Uranium Concentration | 25 | 0 | 2.2 | 0.2 | 667 | 0.03 |

* Normal Sampling Frequency: Continuous; composited over one week.

** Maximum permissible concentrations for continuous exposure of the general population.

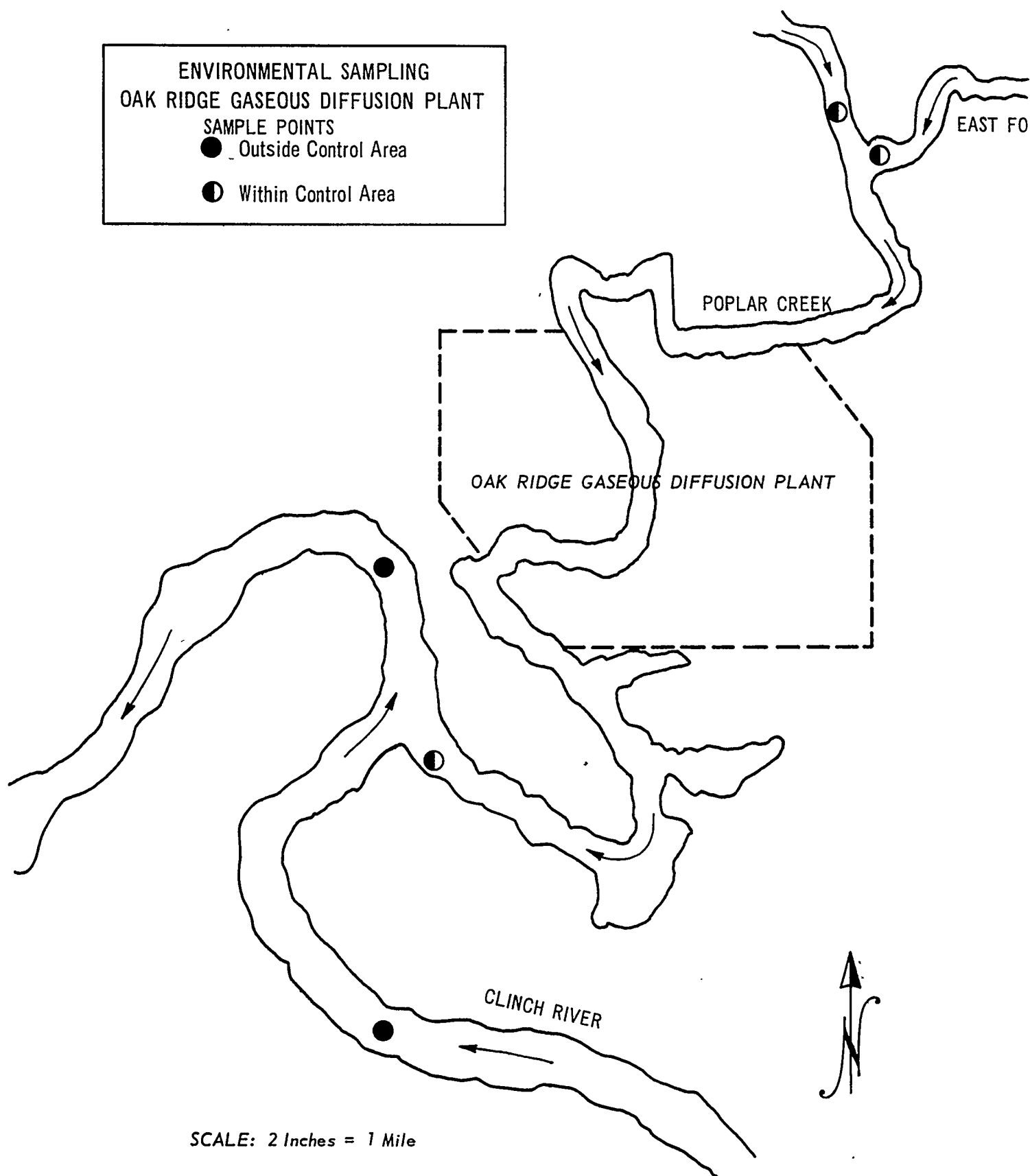


FIGURE 2

UNION CARBIDE NUCLEAR COMPANY • DIVISION OF



CORPORATION

POST OFFICE BOX P. OAK RIDGE, TENNESSEE

February 13, 1963

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie, Manager
Oak Ridge Operations

Gentlemen:

Dissemination to the Public of Data
on Environmental Levels of Radioactivity

As requested, we are enclosing eighty copies of the report for the second half of 1962 on Environmental Levels of Radioactivity for the Oak Ridge Area.

Very truly yours,

UNION CARBIDE NUCLEAR COMPANY

C. E. Larson
C. E. Larson, Vice President

CEL:KZM:dc

Enclosures

cc w/encl.: F. R. Bruce
D. M. Davis (10)
W. H. Jordan
K. Z. Morgan
J. P. Murray (4)
ORGDP, Safety and Health
Department (2)
J. A. Swartout (2)

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

(Report for Period, July - December, 1962)

Compiled by the

Applied Health Physics Section

Health Physics Division

OAK RIDGE NATIONAL LABORATORY

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to trenches located in the Conasauga shale formation. (The use of pits for disposal of liquid waste was discontinued as of November, 1962.) Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

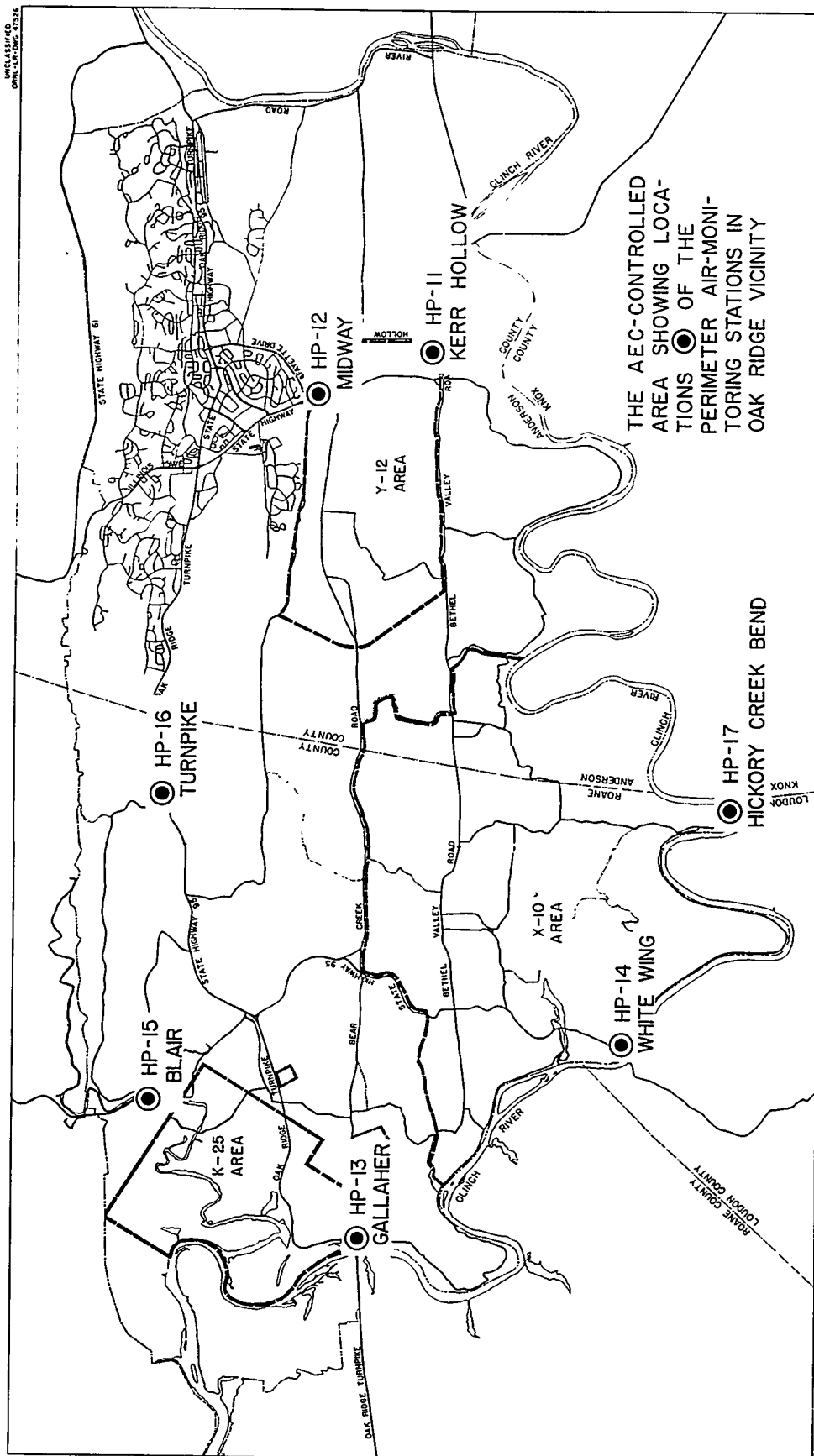
Air Monitoring

Atmospheric contamination by long-lived fission products and fall-out occurring in the general environment of East Tennessee is monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of seven stations encircling the Oak Ridge Area at distances of from 12 to 75 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c}/\text{cc}$ of air sampled.

Atmospheric contamination by alpha-emitting materials, interpreted as uranium, is determined by taking continuous air samples at five locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

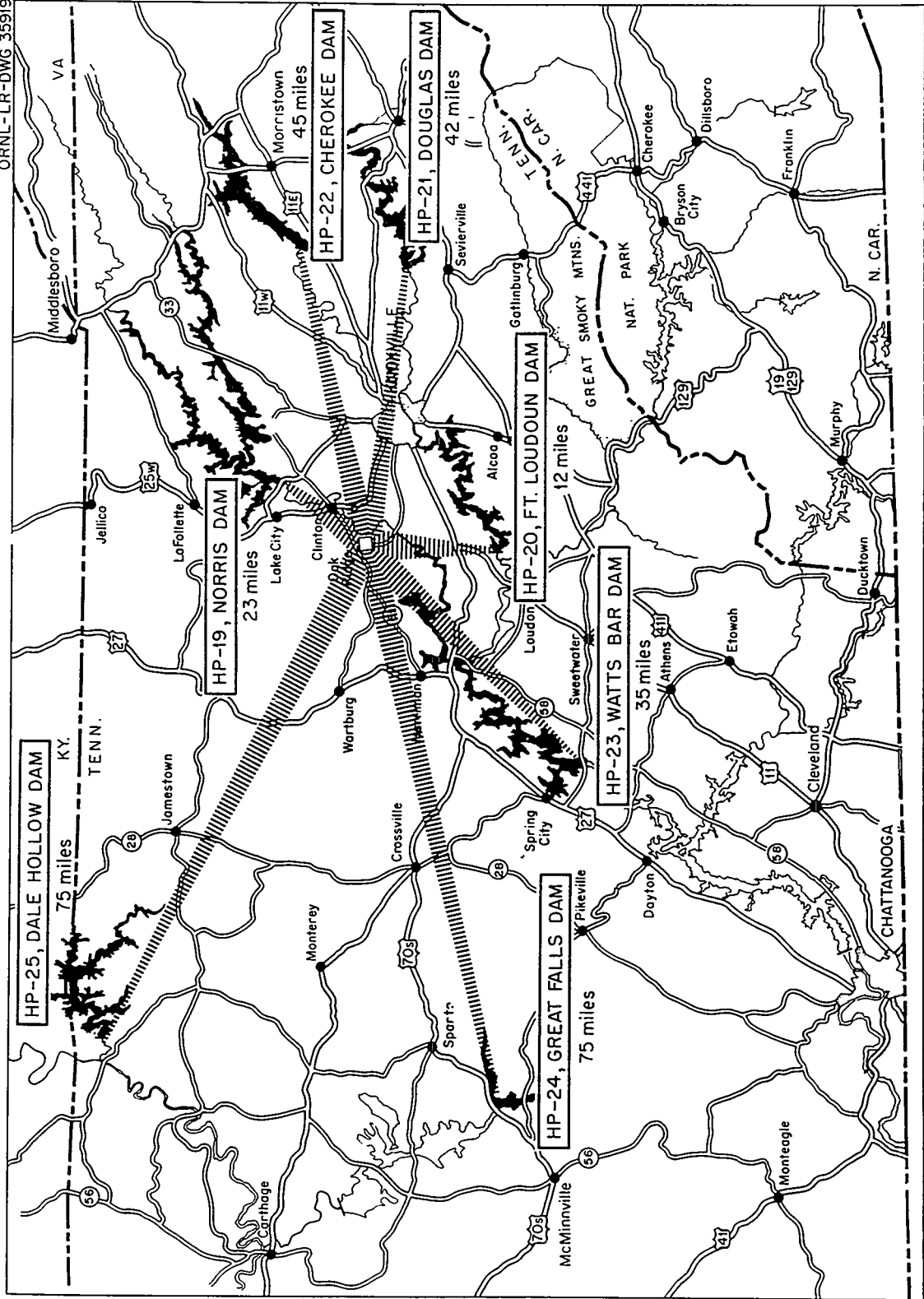
Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant and the



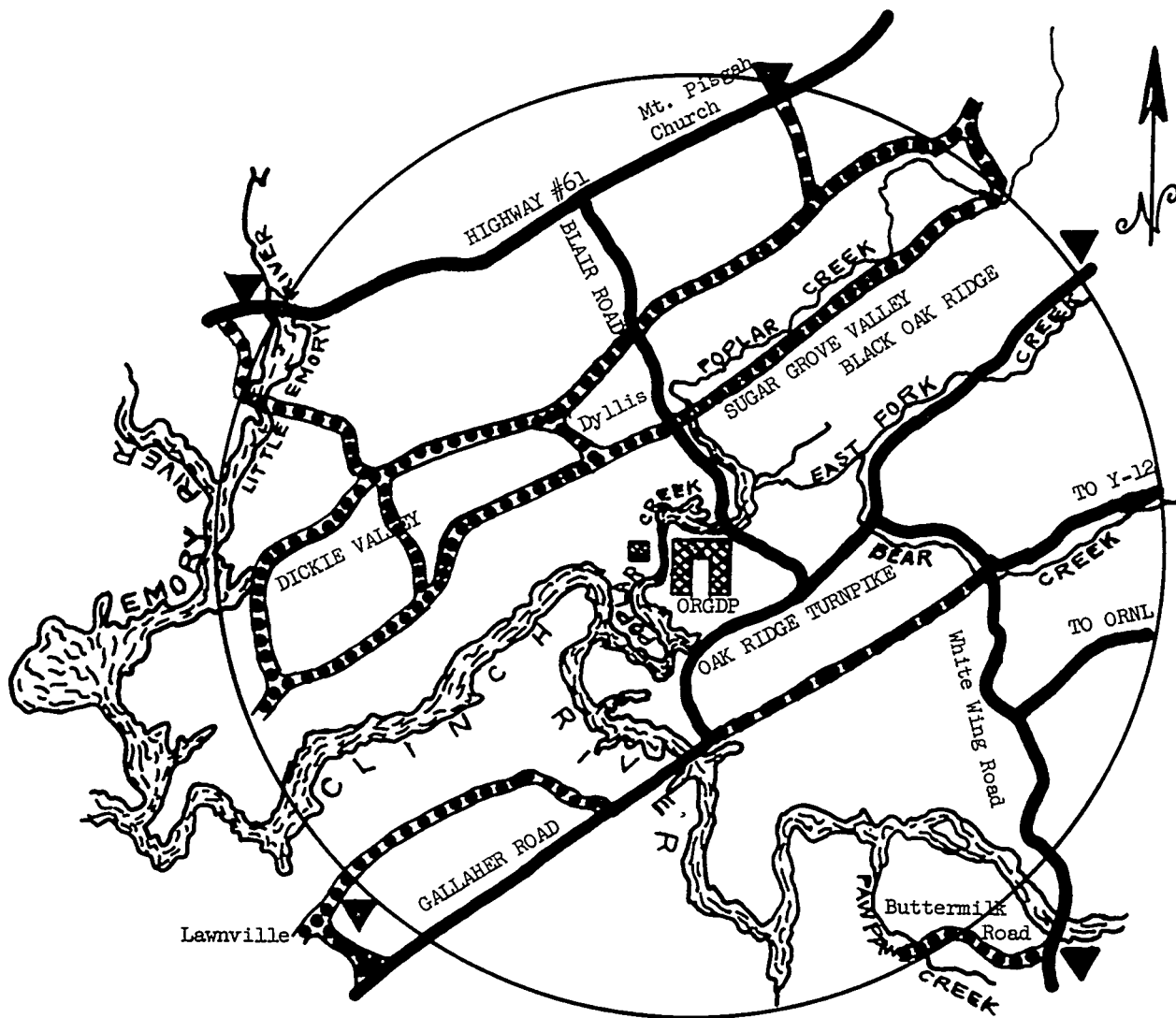
STATION SITES FOR PERIMETER AIR MONITORING SYSTEM

Figure 1



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

AIR

▲ Sampling Location - Five Miles from Plant

Figure 3

Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

Analyses are made of the effluent for the long-lived radionuclides only since cooling time and hold-up time in the waste effluent system is such that short-lived radionuclides are not present. The fraction of the activity comprised by each isotope is determined from the analyses. A weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

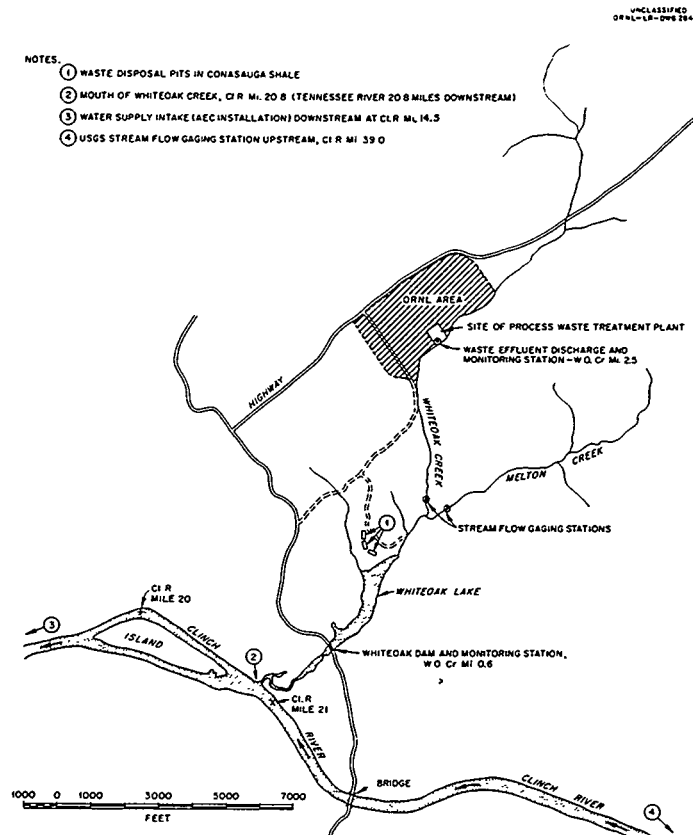
Gamma Measurements

External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Muller tube at a distance of three feet aboveground, and the results are tabulated in terms of mr/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the second half of 1962 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

The average air contamination levels for gross beta activity, as shown by the continuous air monitoring filter data for the immediate and remote environs of the plants, were 3.0% and 3.6% respectively, of the



Location Sketch Map
ORNL Area Surface Drainage

Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R1

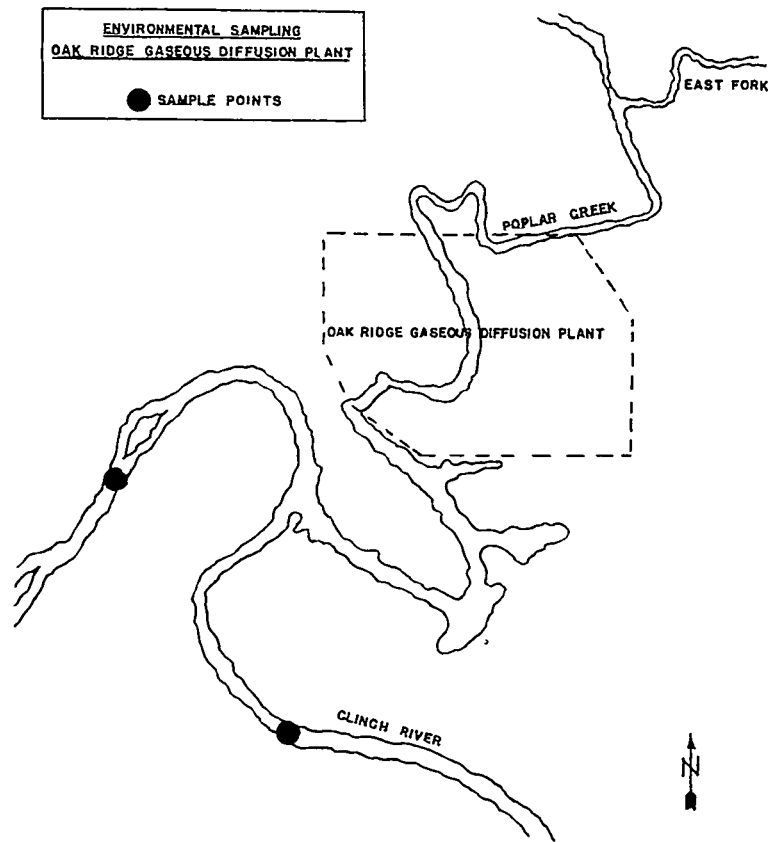


Figure 5

maximum permissible concentration for populations in the neighborhood of a controlled area. These values are approximately 25% lower than those for the first half of 1962 and are no greater than the average of those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network for the period, July through October, 1962.

The average air-borne alpha activity in the environs of the ORGDP, five miles from ORGDP, was 17% of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of most of the wastes, and at Mile 4.5, near Kingston, Tennessee, were 2.9×10^{-7} $\mu\text{c/ml}$ and 1.2×10^{-7} $\mu\text{c/ml}$ respectively. These values are 6.4% and 3.9% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 1.3×10^{-11} $\mu\text{c/ml}$ which is less than 0.0003% of the weighted average $(\text{MPC})_w$ value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all Oak Ridge Plants, was 0.02% of the $(\text{MPC})_w$ for uranium.

Fall-out from weapons tests continues to result in increased concentrations of Sr^{90} , Ce^{144} , and $\text{Zr}^{95}\text{-Nb}^{95}$ in Clinch River water upstream from the point of entry of the wastes into the river. However, the concentrations of these radionuclides show a decrease from those found during the first half of 1962.

External gamma radiation in the Oak Ridge Area averaged 0.031 mr/hr. This level is no higher than that reported for some areas of the United States by the U. S. Public Health Service Radiation Surveillance Network.

Conclusion

The air and ground contamination in both the immediate and remote environs of Oak Ridge was influenced by fall-out from sources other than local plant operations. From analysis of the data taken, it is concluded that the Oak Ridge Operations contributed little to the air or ground contamination found in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes from local operations, the resulting concentrations in the river are well below the maximum permissible concentration recommended by the NCRP for populations in the neighborhood of an atomic energy installation.

TABLE I
CONTINUOUS AIR MONITORING DATA
Long-Lived Gross Beta Activity of
Particulates in Air

July - December, 1962

| Station Number | Location | Number of Samples Taken | Units of 10^{-13} $\mu\text{c/cc}$ | | | % of (MPC) _a ^c |
|---------------------------|--------------------|-------------------------|--------------------------------------|----------------------|---------|--------------------------------------|
| | | | Maximum ^a | Minimum ^b | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-11 | Kerr Hollow Gate | 26 | 73 | 12 | 29 | 2.9 |
| HP-12 | Midway Gate | 26 | 73 | 14 | 33 | 3.3 |
| HP-13 | Gallaher Gate | 26 | 56 | 12 | 27 | 2.7 |
| HP-14 | White Oak Dam | 26 | 62 | 11 | 29 | 2.9 |
| HP-15 | Blair Gate | 26 | 72 | 17 | 33 | 3.3 |
| HP-16 | Turnpike Gate | 74 ^d | 81 | 14 | 34 | 3.4 |
| HP-17 | Hickory Creek Bend | 26 | 59 | 11 | 28 | 2.8 |
| Average | | | | | 30 | 3.0 |
| <u>Remote Stations</u> | | | | | | |
| HP-19 | Norris Dam | 26 | 85 | 16 | 35 | 3.5 |
| HP-20 | Loudoun Dam | 26 | 87 | 17 | 38 | 3.8 |
| HP-21 | Douglas Dam | 26 | 82 | 13 | 36 | 3.6 |
| HP-22 | Cherokee Dam | 26 | 99 | 17 | 36 | 3.6 |
| HP-23 | Watts Bar Dam | 26 | 85 | 11 | 39 | 3.9 |
| HP-24 | Great Falls Dam | 26 | 159 | 15 | 40 | 4.0 |
| HP-25 | Dale Hollow Dam | 26 | 69 | 14 | 32 | 3.2 |
| Average | | | | | 36 | 3.6 |

^aMaximum weekly average concentration.

^bMinimum weekly average concentration.

^c(MPC)_a is taken to be 10^{-10} $\mu\text{c/cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.

^dSamples collected on daily schedule beginning 5/7/62. Maximum and minimum daily average concentrations were 178×10^{-13} $\mu\text{c/cc}$ and 27×10^{-13} $\mu\text{c/cc}$ respectively.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA

July - December, 1962

| Distance from Center of Plant | Type of Analyses | No. of Samples* | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | |
|----------------------------------|---------------------|--------------------|--------------------------------------|------|-------|---------|--------------------|----------------------|
| | | | Direction from Plant | | | Average | (MPC) _a | % (MPC) _a |
| | | | North | East | South | West | | |
| 5-Mile Radius | Gross Alpha | 2431 | 2.8 | 3.6 | 3.0 | 4.6 | 3.3 | 20 |
| | | | | | | | | 17 |

* Normal Sampling Frequency: Continuous, averaged over 8 hours.

TABLE III
CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

July - December, 1962

| Number of Samples Taken | Units of 10^{-7} $\mu\text{c/ml}$ | | | % of $(\text{MPC})_w$ |
|----------------------------|-------------------------------------|----------------------|---------|-----------------------|
| | Maximum ^a | Minimum ^b | Average | |
| 182 | 11.7 | 0.09 | 2.9 | 6.4 |

^aMaximum weekly average.

^bMinimum weekly average.

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

July - December, 1962

| Location | Units of 10^{-8} $\mu\text{c}/\text{ml}$ | | | | | | | | % of (MPC) _w |
|-----------------------|--|-------------------|-------------------|-----------------------|------------------|-----------------------------------|--------------------------|---------------------------------|----------------------------|
| | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | Zr ⁹⁵ Nb ⁹⁵ | Average Beta Activity | (MPC) _w ^a | |
| Mi. 41.5 ^b | 0.11 | 0.10 | 0.02 | 0.7 | * | 0.16 | 1.1 | 89 | 1.2 |
| Mi. 20.8 ^c | 0.14 | 0.02 | 0.09 | 9.4 | 0.18 | 0.02 | 29 | 450 | 6.4 |
| Mi. 4.5 | 0.28 | 0.23 | 0.01 | 11 | 0.18 | 0.34 | 12 | 310 | 3.9 |

^aWeighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^bSampling station moved from Clinch River Mile 33.2 to Mile 41.5 about January 1, 1962.

^cValues given for this location are calculated values based on levels of waste released and the dilution afforded by the river; they do not include amounts of radioactive material (e.g., fall-out) that may enter the river upstream from CRM 20.8.

* None detected.

TABLE V
URANIUM CONCENTRATION IN THE CLINCH RIVER

July - December, 1962

| Sampling Point | Type of Analyses Made | No. of Samples* | Units of 10^{-8} $\mu\text{c/ml}$ | | | $\%$ (MPC) _w |
|-----------------------|-----------------------|-----------------|-------------------------------------|---------|---------|-------------------------|
| | | | Maximum | Minimum | Average | |
| Upstream from ORGDP | Uranium Concentration | 25 | 0.6 | 0 | 0.1 | 2000 |
| Downstream from ORGDP | Uranium Concentration | 26 | 5.4 | 0 | 0.4 | 2000 |
| | | | | | | < 0.01 |
| | | | | | | 0.02 |

* Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS
mr/hr

July - December, 1962

| Station Number | Location | July | August | Sept. | Oct. | Nov. | Dec. | Average |
|----------------|-------------------------|-------|--------|-------|-------|-------|-------|---------|
| 1 | Solway Gate | 0.030 | 0.045 | 0.025 | 0.042 | 0.040 | 0.034 | 0.036 |
| 2 | Y-12 East Portal | 0.023 | 0.044 | 0.026 | 0.034 | 0.029 | 0.024 | 0.030 |
| 3 | Newcomb Road, Oak Ridge | 0.027 | 0.027 | 0.023 | 0.034 | 0.028 | 0.026 | 0.028 |
| 4 | Gallaher Gate | 0.025 | 0.037 | 0.033 | 0.040 | 0.049 | 0.041 | 0.038 |
| 5 | White Wing Gate | 0.018 | 0.021 | 0.025 | 0.035 | 0.018 | 0.023 | 0.023 |
| Average | | 0.025 | 0.035 | 0.026 | 0.037 | 0.033 | 0.030 | 0.031 |

**UNION
CARBIDE**

INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name) **Dr. K. Z. Morgan**
Company
Location **ORNL**

Date **January 18, 1963**

Originating Dept.

Answering letter date

Copy to **Mr. K. W. Bahler**
Mr. A. F. Becher
Mr. J. P. Murray
Health Physics File - RC ✓

Subject **News Release on Environmental
Surveys**

Attached are data for the semiannual news release as requested by the AEC-ORO,
covering environmental surveys made by our plant forces at off-plant locations
during the last half of CY-1962.


R. G. Jordan

RGJ:mh

Attachment

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JULY THROUGH DECEMBER, 1962

The results of sampling of the environs of the Oak Ridge Gaseous Diffusion Plant during the second half of 1962 revealed that the amount of uranium in the surface waterways and in the air as far as five miles from the plant area is not significantly different from the normal background values established for this region.

The average air-borne alpha activity at the five-mile sampling stations continued to be less than one-half of the maximum permissible concentration for the general population. Environmental air sampling data are shown in Table 1 and the continuous sampling points in Figure 1.

Continuous sampling of the surface waterways adjacent to the plant revealed no instances where the uranium concentration exceeded the maximum permissible concentration specified for water (MPC_w).^{*} The average activity of natural uranium materials in the Clinch River reflecting the effects of all of the Oak Ridge plants was 0.06% of the MPC_w . Sampling data are shown in Table 2 and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements at five locations surrounding the ORGDP Area averaged 0.020 mr/hour. This is the same as the average background levels obtained throughout the United States by the U. S. Public Health Service Radiation Surveillance Network, employing similar methods and detection instruments.

* National Bureau of Standards Handbook No. 69, Maximum permissible concentrations in water for populations adjacent to AEC installations based on a 168-hour continuous exposure to natural uranium.

TABLE 1

ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: July-December 1962

| Distance from Center of Plant | Type of Analysis Made | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | | Average % MPC _a ** |
|----------------------------------|--------------------------|-------------------|--------------------------------------|-----|-----|-----|----------------------------------|-----|----------------------------------|
| | | | Direction from Plant | | | | Max. Permissible Conc. (MPCa) | | |
| | | | N | E | S | W | | Av. | |
| 5-mile Radius* | Gross Alpha | 2431 | 2.8 | 3.6 | 3.0 | 4.6 | 3.3 | 6.7 | 49.5 |

* Normal Sampling Frequency: Continuous; averaged over 8 hours.

**Maximum permissible concentrations for continuous exposure of the general population.

TABLE 2

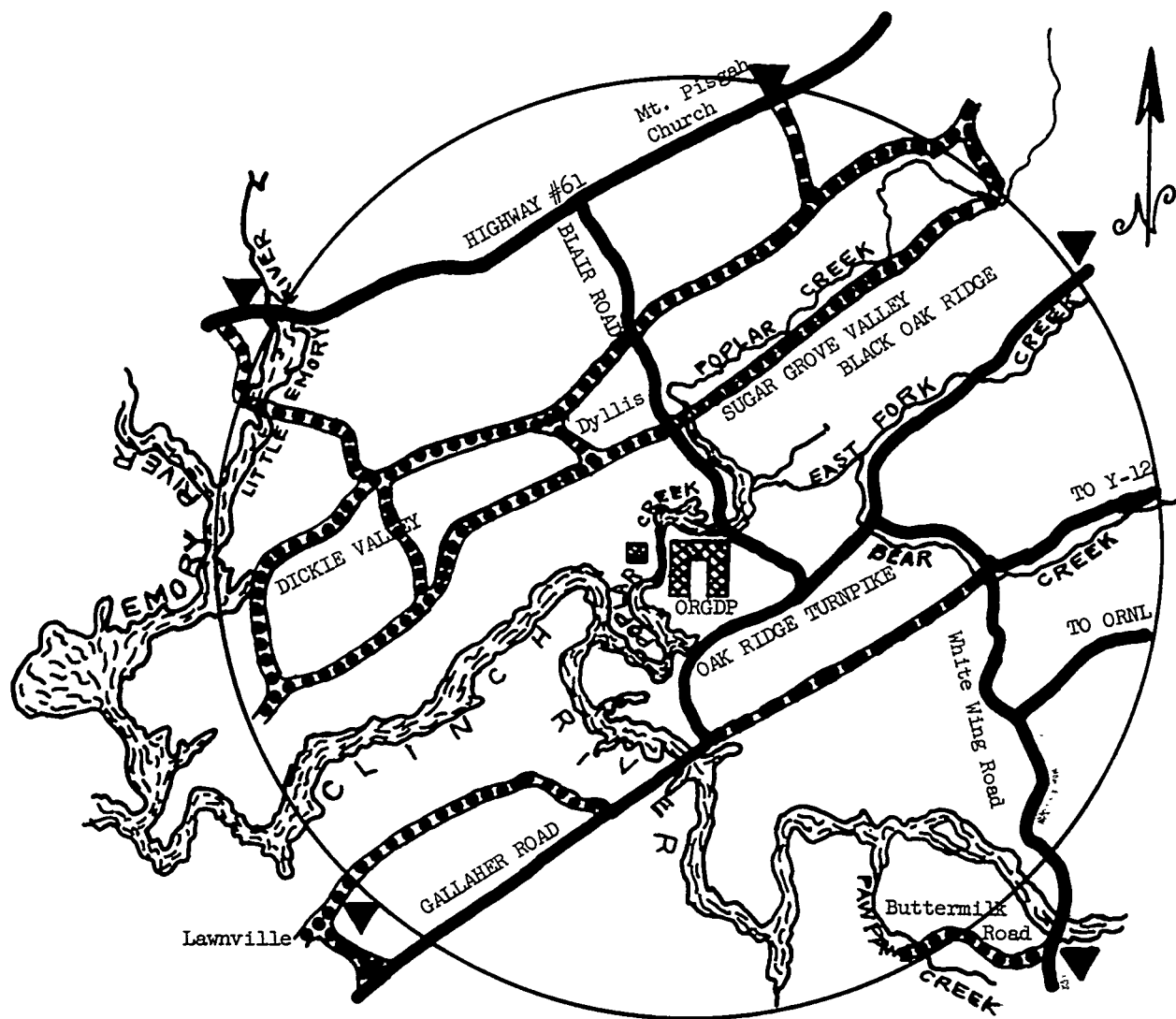
ENVIRONMENTAL SAMPLING - LOCAL STREAMS
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: July-December 1962

| Location of Point* | Type of Analysis | No. of Samples | Units of 10 ⁻⁸ μc/cc | | | | Average % MPC _w ** |
|-----------------------|--------------------------|-------------------|---------------------------------|------|---|-----|----------------------------------|
| | | | Plant Experience | | Max. Permissible Conc. (MPC _w) | | |
| | | | Low | High | Av. | | |
| Upstream | Uranium Concentration | 25 | 0 | 0.6 | 0.1 | 667 | <0.01 |
| Downstream | Uranium Concentration | 26 | 0 | 5.4 | 0.4 | 667 | 0.06 |

* Normal Sampling Frequency: Continuous; composited over one week.

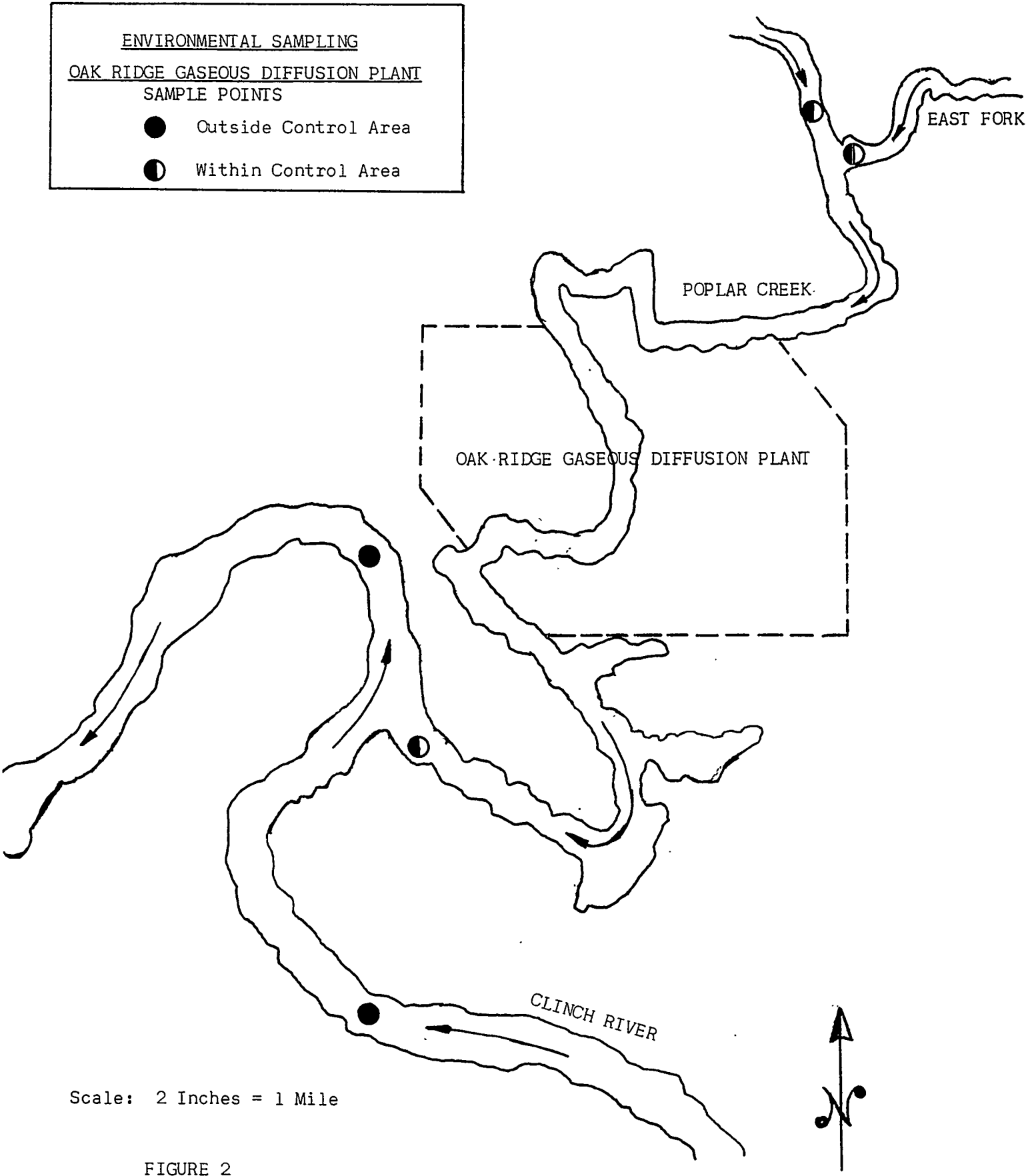
**Maximum permissible concentrations for continuous exposure of the general population.



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP
AIR

▼ Sampling Location - Five Miles from Plant

FIGURE 1



UNION CARBIDE NUCLEAR COMPANY • DIVISION OF



CORPORATION

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

October 15, 1962

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie, Manager
Oak Ridge Operations

Gentlemen:

Dissemination to the Public of Data
on Environmental Levels of Radioactivity

As requested, we are enclosing eighty copies of the report for the first half of 1962 on Environmental Levels of Radioactivity for the Oak Ridge Area.

Very truly yours,

UNION CARBIDE NUCLEAR COMPANY

for Clark E. Larson

C. E. Larson, Vice President

CEL:KZM:dw

Enclosures

cc w/encl.: F. R. Bruce
F. L. Culler
D. M. Davis (10)
W. H. Jordan
K. Z. Morgan
ORGDP, Safety and Health
Department (2)
J. A. Swartout (2)
J. P. Murray (4)

ORGDP, Safety and Health
Physics

October 15, 1962

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

(Report for Period, January - June, 1962)

Compiled by the

Applied Health Physics Section

Health Physics Division

OAK RIDGE NATIONAL LABORATORY

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to trenches and pits located in the Conasauga shale formation. Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

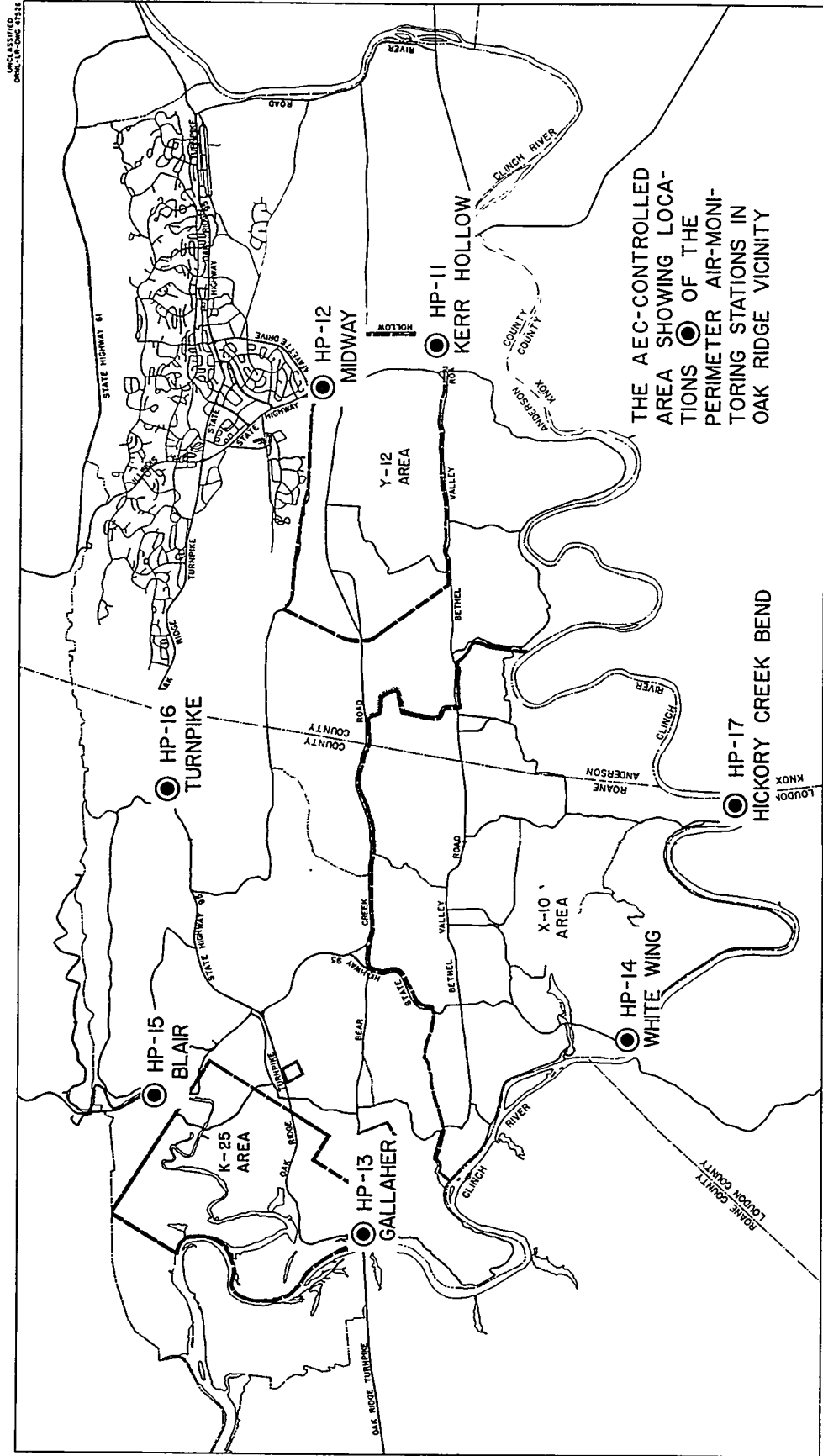
Air Monitoring

Atmospheric contamination by long-lived fission products and fall-out occurring in the general environment of East Tennessee is monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of seven stations encircling the Oak Ridge Area at distances of from 12 to 75 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c/cc}$ of air sampled.

Atmospheric contamination by alpha-emitting materials, interpreted as uranium, is determined by taking continuous air samples at five locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

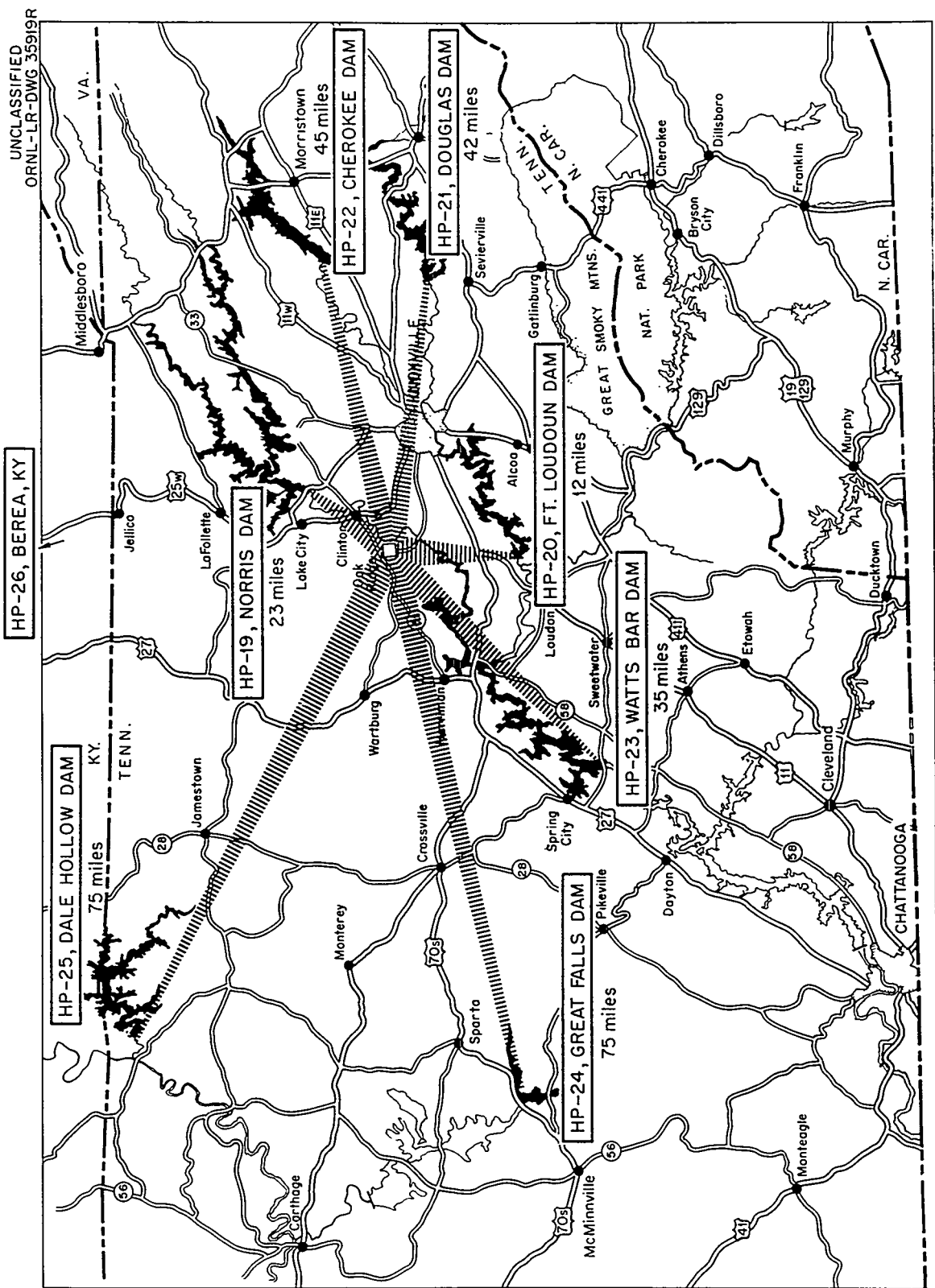
Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are controlled so that resulting average concentrations in the



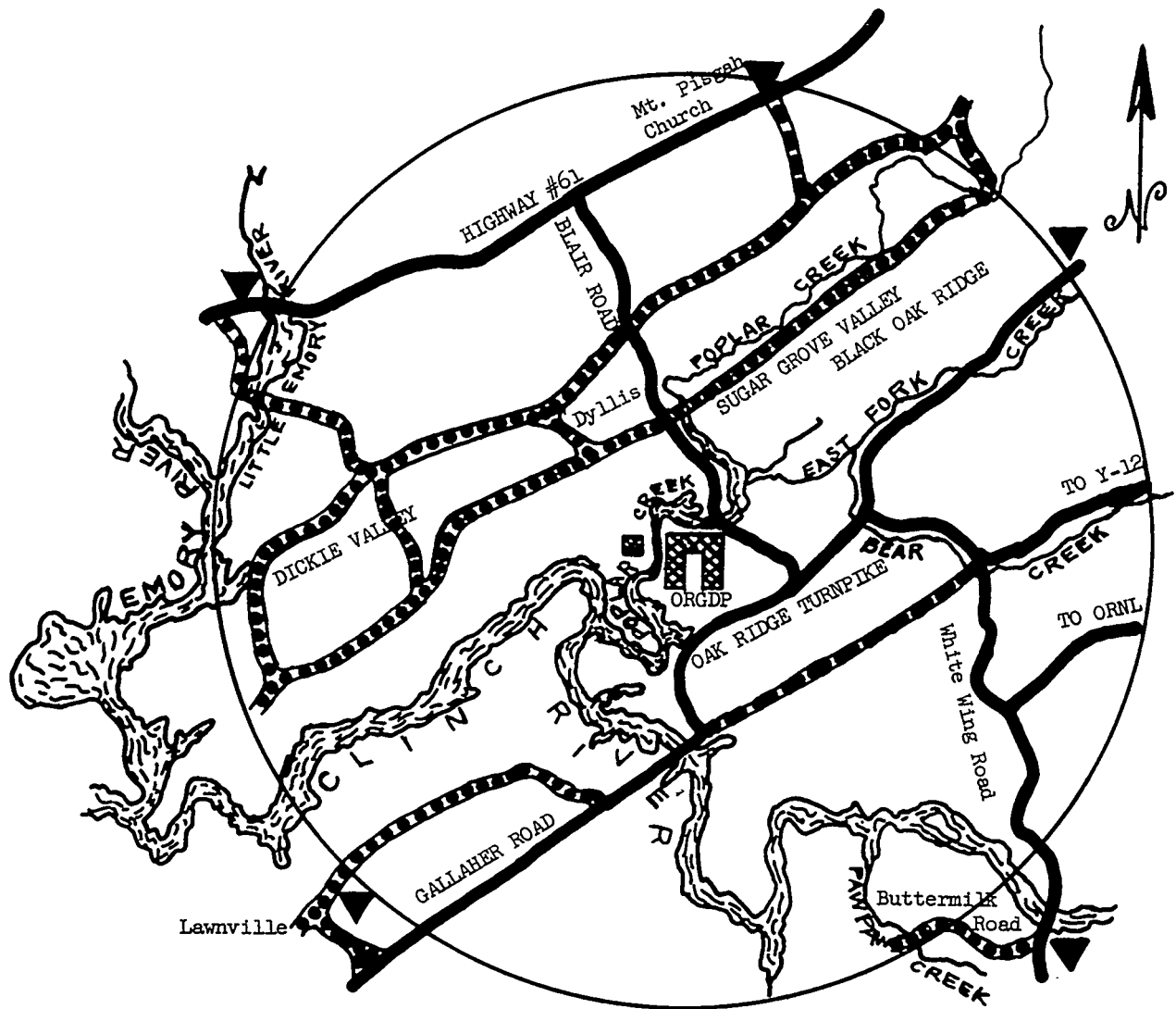
STATION SITES FOR PERIMETER AIR MONITORING SYSTEM

Figure 1



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

AIR

▼ Sampling Location - Five Miles from Plant

Figure 3

Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

Analyses are made of the effluent for the long-lived radionuclides only since cooling time and hold-up time in the waste effluent system is such that short lived radionuclides are not present. The fraction of the activity comprised by each isotope is determined from the analyses. A weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

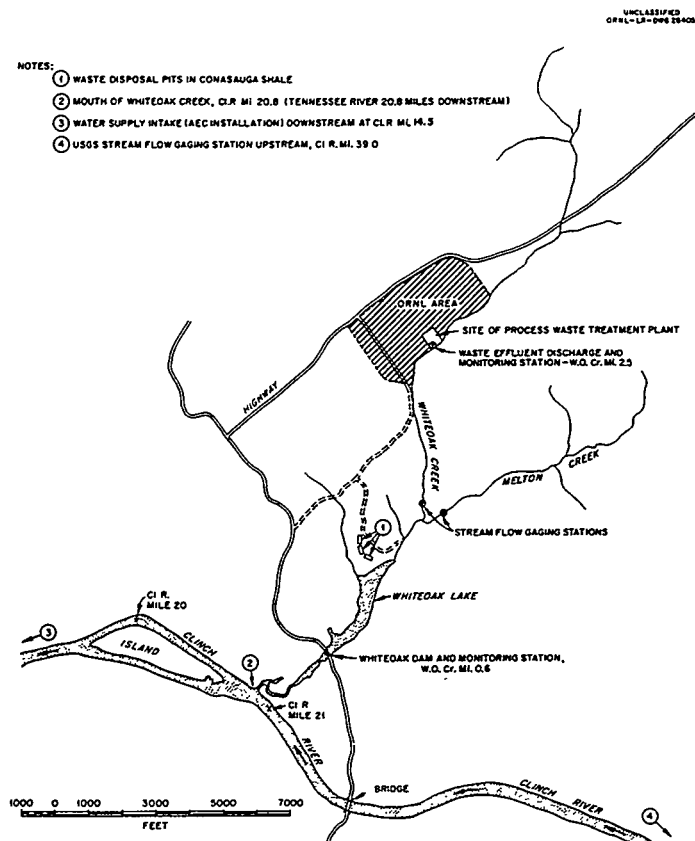
Gamma Measurements

External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Muller tube at a distance of three feet aboveground, and the results are tabulated in terms of mr/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the first half of 1962 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

The average air contamination levels for gross beta activity, as shown by the continuous air monitoring filter data for the immediate and remote environs of the plants, were 4.1% and 4.9% respectively, of the maximum permissible concentration for populations in the neighborhood of a controlled area. Although these values are approximately 18% higher than those of the last quarter of 1961, they are no greater than the average of those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network for the first six months of 1962.



Location Sketch Map
ORNL Area Surface Drainage

Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R1

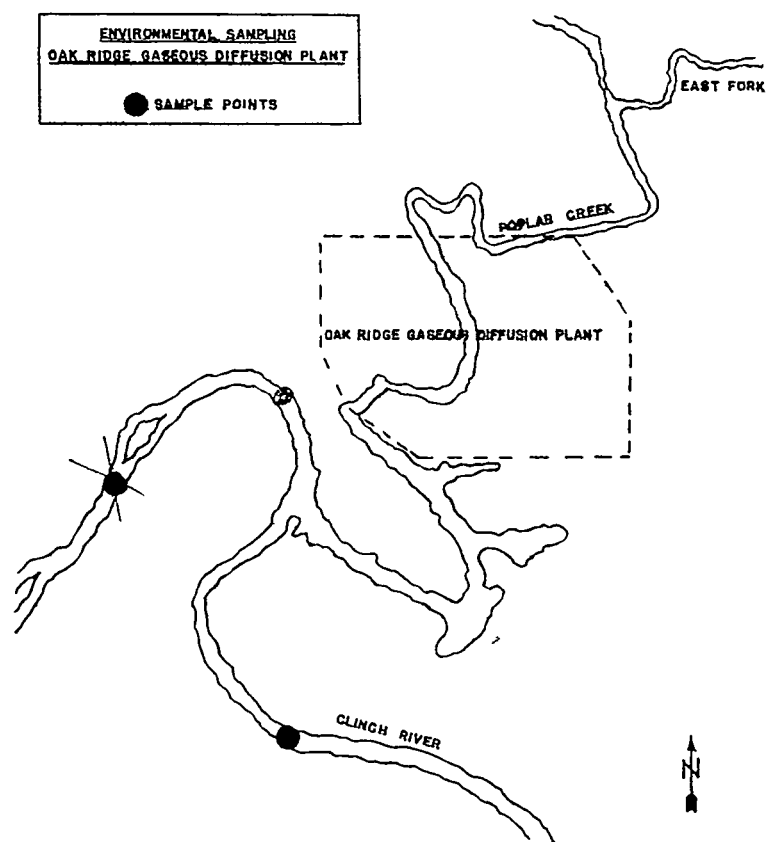


Figure 5

The average air-borne alpha activity in the environs of the ORGDP, five miles from ORGDP, was 8% of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of most of the wastes, and at Mile 4.5, near Kingston, Tennessee, were 3.9×10^{-7} $\mu\text{c/ml}$ and 1.8×10^{-7} $\mu\text{c/ml}$ respectively. These values are 8.2% and 6.2% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 0.8×10^{-11} $\mu\text{c/ml}$ which is less than 0.0002% of the weighted average (MPC)_w value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all Oak Ridge Plants, was less than 0.01% of the (MPC)_w for uranium.

Increased concentrations of Sr^{90} , Ce^{144} , and Zr^{95} Nb^{95} were found in Clinch River water, Table IV CRM 41.5, upstream from the point of entry of the wastes into the river. These increases may be attributed to fall-out from weapons tests.

External gamma radiation in the Oak Ridge Area averaged 0.027 mr/hr. This level is no higher than that reported for some areas of the United States by the U. S. Public Health Service Radiation Surveillance Network.

Conclusion

The air and ground contamination in both the immediate and remote environs of Oak Ridge was influenced by fall-out from sources other than local plant operations. From analysis of the data taken, it is concluded that the Oak Ridge Operations contributed little to the air or ground contamination found in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes from local operations, the resulting concentrations in the river are well below the maximum permissible concentration recommended by the NCRP for populations in the neighborhood of an atomic energy installation.

TABLE I

CONTINUOUS AIR MONITORING DATA
Long-Lived Gross Beta Activity of
Particulates in Air

January - June, 1962

| Station Number | Location | Number of Samples Taken | Units of 10^{-13} $\mu\text{c/cc}$ | | | % of (MPC) _a ^c |
|------------------------------------|--------------------|-------------------------|--------------------------------------|----------------------|---------|--------------------------------------|
| | | | Maximum ^a | Minimum ^b | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-11 | Kerr Hollow Gate | 26 | 67 | 23 | 38 | 3.8 |
| HP-12 | Midway Gate | 26 | 74 | 26 | 41 | 4.1 |
| HP-13 | Gallaher Gate | 26 | 63 | 22 | 38 | 3.8 |
| HP-14 | White Oak Dam | 26 | 69 | 24 | 39 | 3.9 |
| HP-15 | Blair Gate | 26 | 77 | 26 | 46 | 4.6 |
| HP-16 | Turnpike Gate | 74 ^d | 90 | 25 | 43 | 4.4 |
| HP-17 | Hickory Creek Bend | 26 | 82 | 23 | 41 | 4.1 |
| Average | | | | | 41 | 4.1 |
| <u>Remote Stations^e</u> | | | | | | |
| HP-19 | Norris Dam | 26 | 91 | 31 | 52 | 5.2 |
| HP-20 | Loudoun Dam | 26 | 89 | 20 | 47 | 4.7 |
| HP-21 | Douglas Dam | 26 | 97 | 29 | 52 | 5.2 |
| HP-22 | Cherokee Dam | 26 | 73 | 28 | 45 | 4.5 |
| HP-23 | Watts Bar Dam | 26 | 89 | 29 | 50 | 5.0 |
| HP-24 | Great Falls Dam | 26 | 85 | 32 | 51 | 5.1 |
| HP-25 | Dale Hollow Dam | 26 | 85 | 27 | 45 | 4.5 |
| Average | | | | | 49 | 4.9 |

^aMaximum weekly average concentration.

^bMinimum weekly average concentration.

^c(MPC)_a is taken to be 10^{-10} $\mu\text{c/cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.

^dSamples collected on daily schedule beginning 5/7/62. Maximum and minimum daily average concentrations were 306×10^{-13} $\mu\text{c/cc}$ and 8×10^{-13} $\mu\text{c/cc}$ respectively.

^eSampling program at HP-26, Berea, Kentucky, was discontinued January 1, 1962.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA

January - June, 1962

| Distance from Center of Plant | Type of Analyses | No. of Samples* | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | | (MPC) ^a | % (MPC) ^a |
|----------------------------------|---------------------|--------------------|--------------------------------------|------|-------|------|---------|----|--------------------|----------------------|
| | | | Direction from Plant | | | | Average | | | |
| | | | North | East | South | West | | | | |
| 5-Mile Radius | Gross Alpha | 2279 | 1.7 | 1.6 | 1.7 | 1.6 | 1.6 | 20 | 8.0 | |

*Normal Sampling Frequency: Continuous, averaged over 8 hours.

TABLE III
CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

January - June, 1962

| Number of Samples Taken | Units of 10^{-7} $\mu\text{c/ml}$ | | | % of $(\text{MPC})_w$ |
|----------------------------|-------------------------------------|---------|---------|-----------------------|
| | Maximum | Minimum | Average | |
| 182 | 12.0 | 0.19 | 3.9 | 8.2 |

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

January - June, 1962

| Location | Units of 10^{-8} $\mu\text{c}/\text{ml}$ | | | | | | | % of (MPC) _w | |
|-----------------------|--|-------------------|-------------------|-----------------------|------------------|-----------------------------------|--------------------------------|---------------------------------|--------------------|
| | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | Zr ⁹⁵ Nb ⁹⁵ | Average Gross Beta Activity | (MPC) _w ^a | (MPC) _w |
| Mi. 41.5 ^b | 0.20 | 0.17 | 0.01 | 0.9 | * | 0.68 | 2.0 | 96 | 2.1 |
| Mi. 20.8 ^c | 0.22 | 0.03 | 0.12 | 18 | 0.24 | 0.24 | 39 | 482 | 8.2 |
| Mi. 4.5 | 0.41 | 0.27 | 0.12 | 21 | 0.41 | 0.74 | 23 | 371 | 6.2 |

^aWeighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^bSampling station moved from Clinch River Mile 33.2 to Mile 41.5 about January 1, 1962.

^cValues given for this location are calculated values based on levels of waste released and the dilution afforded by the river; they do not include amounts of radioactive material (e.g., fall-out) that may enter the river upstream from CRM 20.8.

*None detected.

TABLE V
URANIUM CONCENTRATION IN THE CLINCH
RIVER

January - June, 1962

| Sampling Point | Type of Analyses Made | No. of Samples* | Units of 10^{-8} $\mu\text{c/ml}$ | | | | % (MFC) _w |
|-----------------------|-----------------------|-----------------|-------------------------------------|---------|---------|--------------------|----------------------|
| | | | Maximum | Minimum | Average | (MFC) _w | |
| Upstream from ORDCP | Uranium Concentration | 27 | 0.11 | 0 | 0.02 | 2000 | < 0.01 |
| Downstream from ORGDP | Uranium Concentration | 27 | 0.09 | 0 | 0.02 | 2000 | < 0.01 |

*Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS
mr/hr

January - June, 1962

| Station Number | Location | January | February | March | April | May | June | Average |
|----------------|-------------------------|---------|----------|-------|-------|-------|-------|---------|
| 1 | Solway Gate | 0.027 | 0.019 | 0.032 | 0.039 | 0.031 | 0.030 | 0.030 |
| 2 | Y-12 East Portal | 0.019 | 0.015 | 0.023 | 0.023 | 0.021 | 0.027 | 0.021 |
| 3 | Newcomb Road, Oak Ridge | 0.023 | 0.024 | 0.028 | 0.030 | 0.026 | 0.028 | 0.027 |
| 4 | Gallaher Gate | 0.031 | 0.021 | 0.034 | 0.054 | 0.031 | 0.034 | 0.034 |
| 5 | White Wing Gate | 0.024 | 0.017 | 0.017 | 0.023 | 0.023 | 0.020 | 0.021 |
| Average | | 0.025 | 0.019 | 0.027 | 0.034 | 0.027 | 0.028 | 0.027 |



INTERNAL CORRESPONDENCE

Safety and Health
Physics

UNION CARBIDE NUCLEAR COMPANY

1962 JUL 19 01 11 PM
POST OFFICE BOX 1, OAK RIDGE, TENNESSEE

To: (Name) Mr. J. C. Hart

Date July 18, 1962

Company

Originating Dept.

Location ORNL

Answering letter date

Copy to Mr. K. W. Bahler

Subject News Release on
Environmental Surveys

Dr. J. S. Lyon

Mr. J. P. Murray

Safety and Health Physics File - RC ✓

Attached are data for the semiannual news release as requested by the AEC-ORO, covering environmental surveys made at off-plant locations during the first half of 1962.

A. P. Huber
A. P. Huber

APH:mh

Attachment

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JANUARY THROUGH JUNE, 1962

The results of sampling by the Oak Ridge Gaseous Diffusion Plant during the first half of 1962 revealed that the amount of uranium in the streams adjacent to the plant and in the air out as far as five miles is not significantly different from the normal background values established for this region.

The average air-borne alpha activity at sampling locations on a five-mile radius from the plant continued to be only a small fraction of the maximum permissible concentration for the general population adjacent to AEC installations. Environmental air sampling data are shown in Table 1 and the continuous sampling points in Figure 1.

Continuous sampling of the surface waterways adjacent to the plant revealed no instances where the uranium concentration exceeded the maximum permissible concentration specified for water MPC_w .^{*} The average activity of natural uranium materials in the Clinch River reflecting the effects of all of the Oak Ridge Plants was less than 0.01% of the MPC_w . Sampling data are shown in Table 2 and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements at five locations surrounding the ORGDP Area averaged 0.020 mr/hour. This is the same as the average background levels obtained throughout the United States by the U. S. Public Health Services Radiation Surveillance Network, employing similar methods and detection instruments.

* National Bureau of Standards Handbook No. 69, Maximum permissible concentrations in water for populations adjacent to AEC installations based on a 168-hour continuous exposure to natural uranium.

Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant
July 16, 1962

July 16, 1962

TABLE 1

ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: January-June 1962

| Distance from Center of Plant | Type of Analysis Made | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | Average % MPC _a | |
|----------------------------------|--------------------------|-------------------|--------------------------------------|-----|-----|--|-----|-------------------------------|-----|
| | | | Direction from Plant | | | Max. Permissible Conc. (MPC) _a | | | |
| | | | N | E | S | W | Av. | | |
| 5-Mile Radius* | Gross Alpha | 2279 | 1.7 | 1.6 | 1.7 | 1.6 | 1.6 | 20 | 8.0 |

* Normal Sampling Frequency: Continuous; averaged over 8 hours.

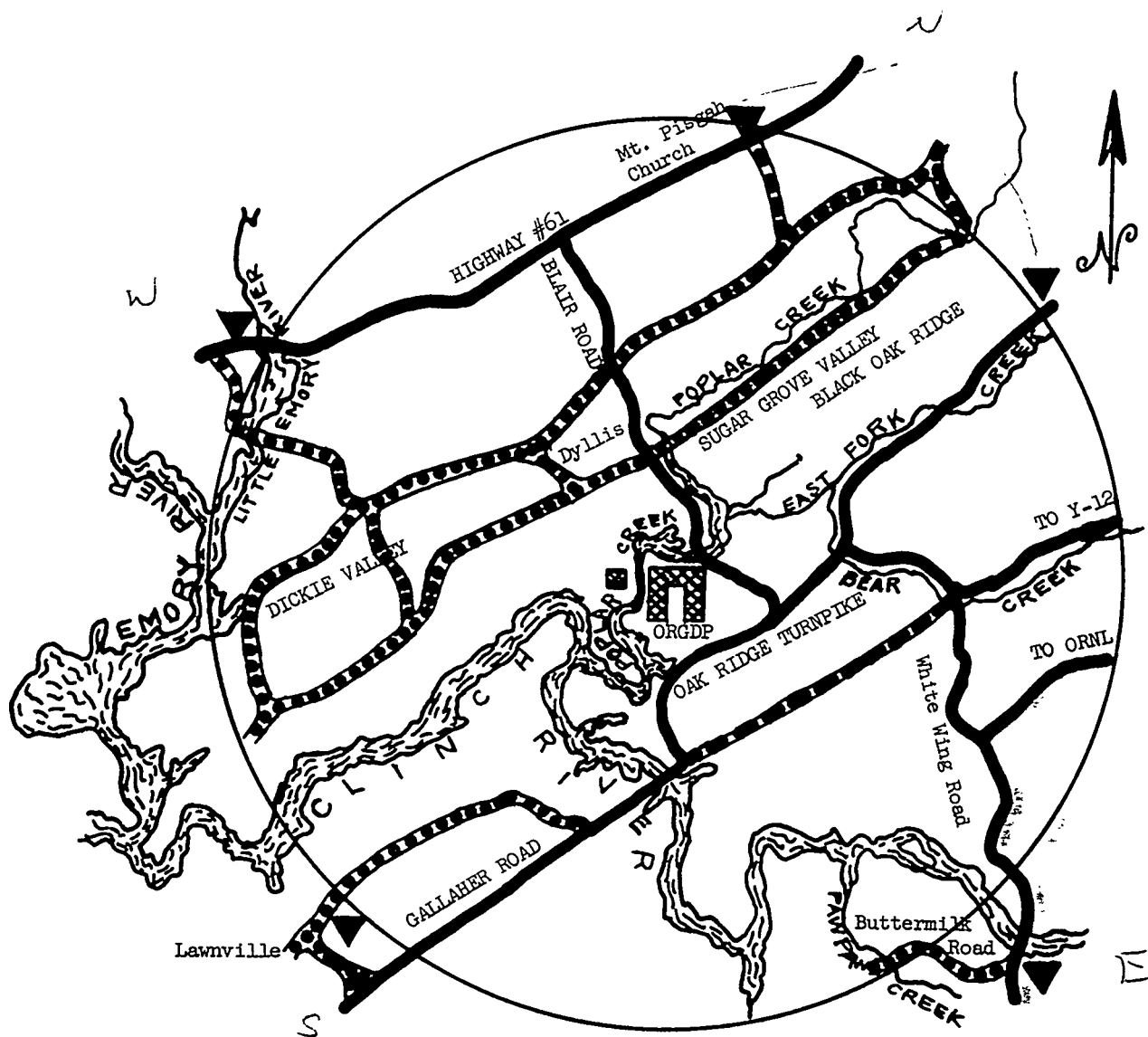
TABLE 2

ENVIRONMENTAL SAMPLING - LOCAL STREAMS
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: January-June 1962

| Period: <u>January-June 1962</u> | | | | | | | |
|----------------------------------|--------------------------|-------------------|-------------------------------------|------|--|------|-------------------------------|
| Location of Point* | Type of Analysis | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | | Average % MPC _w |
| | | | Plant Experience | | Max. Permissible Conc. (MPC) _w | | |
| | | | Low | High | Av. | | |
| Upstream | Uranium Concentration | 27 | 0 | 0.11 | 0.02 | 2000 | < 0.01 |
| Downstream | Uranium Concentration | 27 | 0 | 0.09 | 0.02 | 2000 | < 0.01 |

* Normal Sampling Frequency: Continuous, composited over one week.



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

AIR

▼ Sampling Location - Five Miles from Plant

FIGURE 1

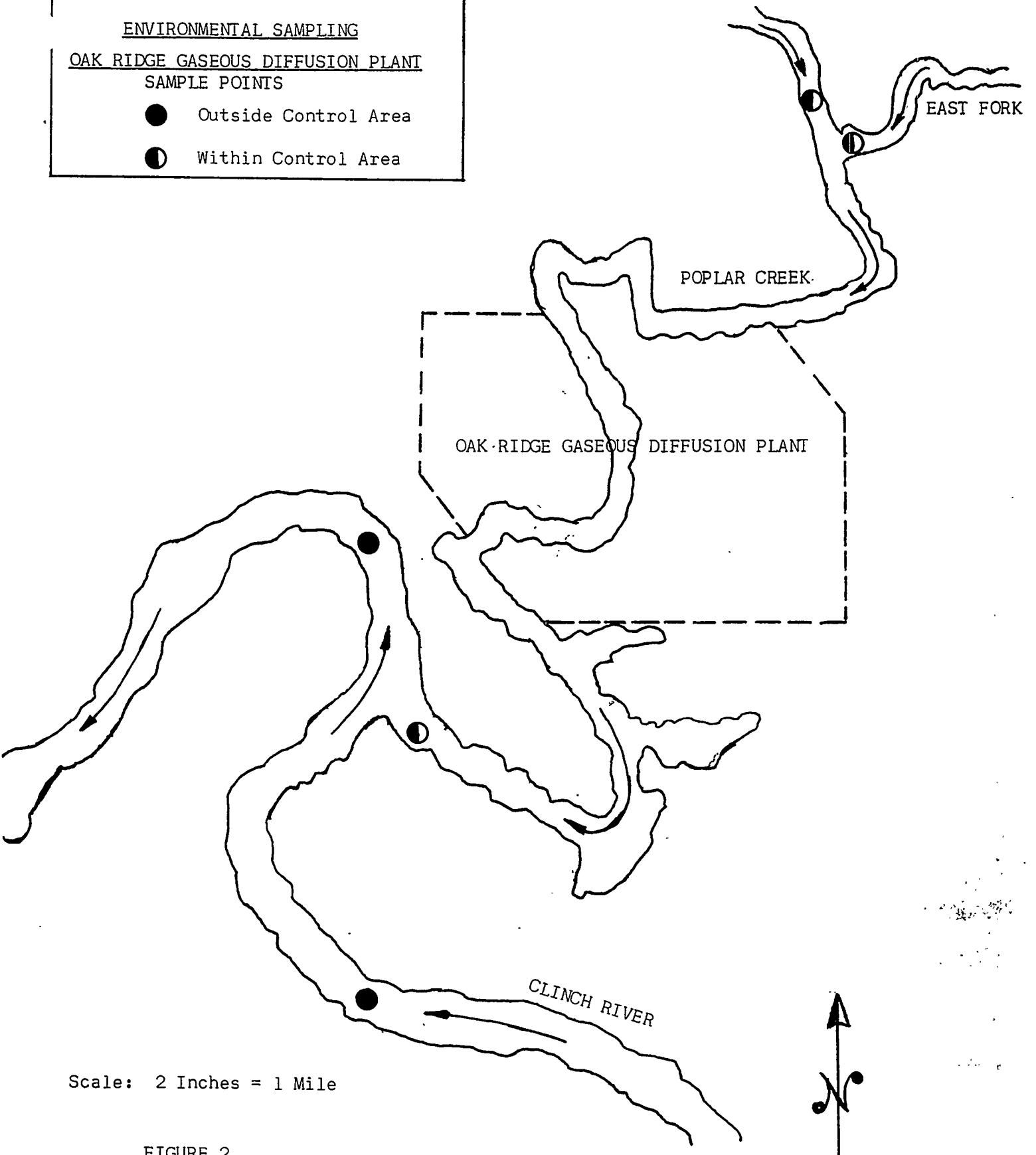
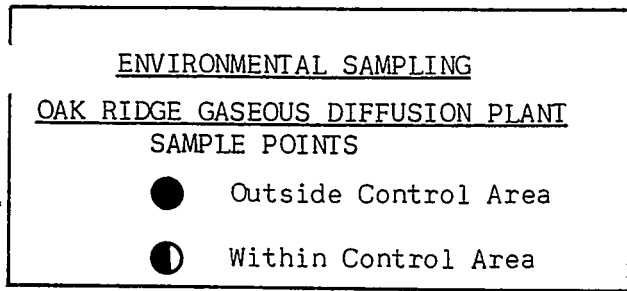


FIGURE 2

UNION CARBIDE NUCLEAR COMPANY • DIVISION OF



CORPORATION

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

March 29, 1962

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie

Gentlemen:

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON
ENVIRONMENTAL LEVELS OF RADIOACTIVITY

As requested, we are enclosing eighty copies of the report for the fourth quarter, 1961, on Environmental Levels of Radioactivity for the Oak Ridge Area.

Yours very truly,

UNION CARBIDE NUCLEAR COMPANY

C. E. Larson
Vice President

CEL:KZM:dw
Enclosures

cc w/encls.: F. R. Bruce
F. L. Culler
J. C. Hart (10)
W. H. Jordan
K. Z. Morgan
ORGDP, Safety and Health
Department (2)
J. A. Swartout (2)
J. P. Murray (4)

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

(Report for Fourth Quarter 1961)

Compiled by the
Applied Health Physics Section
Health Physics Division
OAK RIDGE NATIONAL LABORATORY

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to trenches and pits located in the Conasauga shale formation. Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

Air Monitoring

Atmospheric contamination by long-lived fission products and fall-out occurring in the general environment of East Tennessee are monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of eight stations encircling the Oak Ridge Area at distances of from 12 to 120 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c}/\text{cc}$ of air sampled.

Atmospheric contamination by alpha-emitting materials, interpreted as uranium, is determined by taking continuous air samples at five locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are

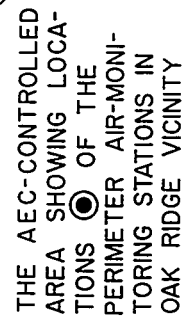
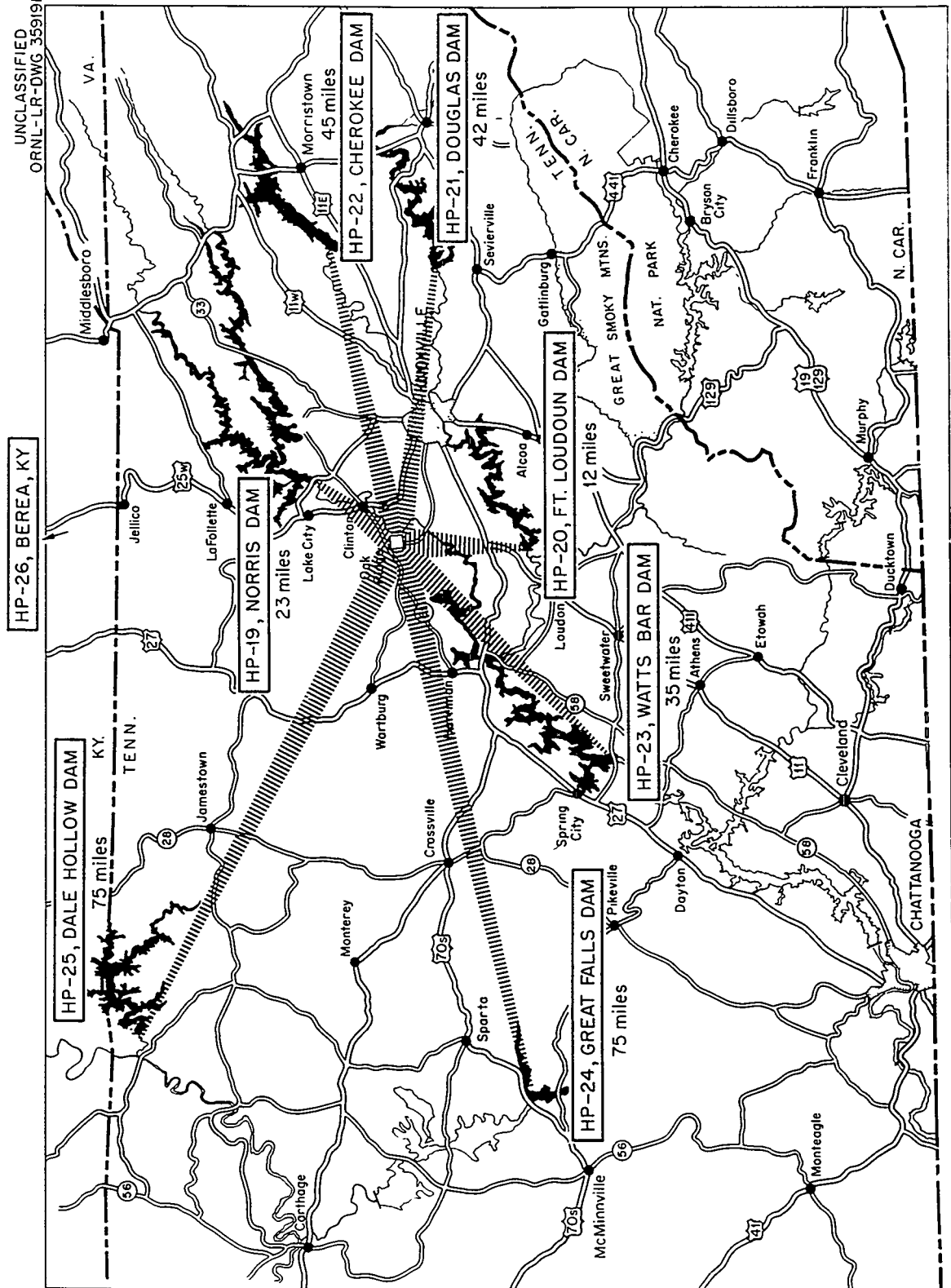
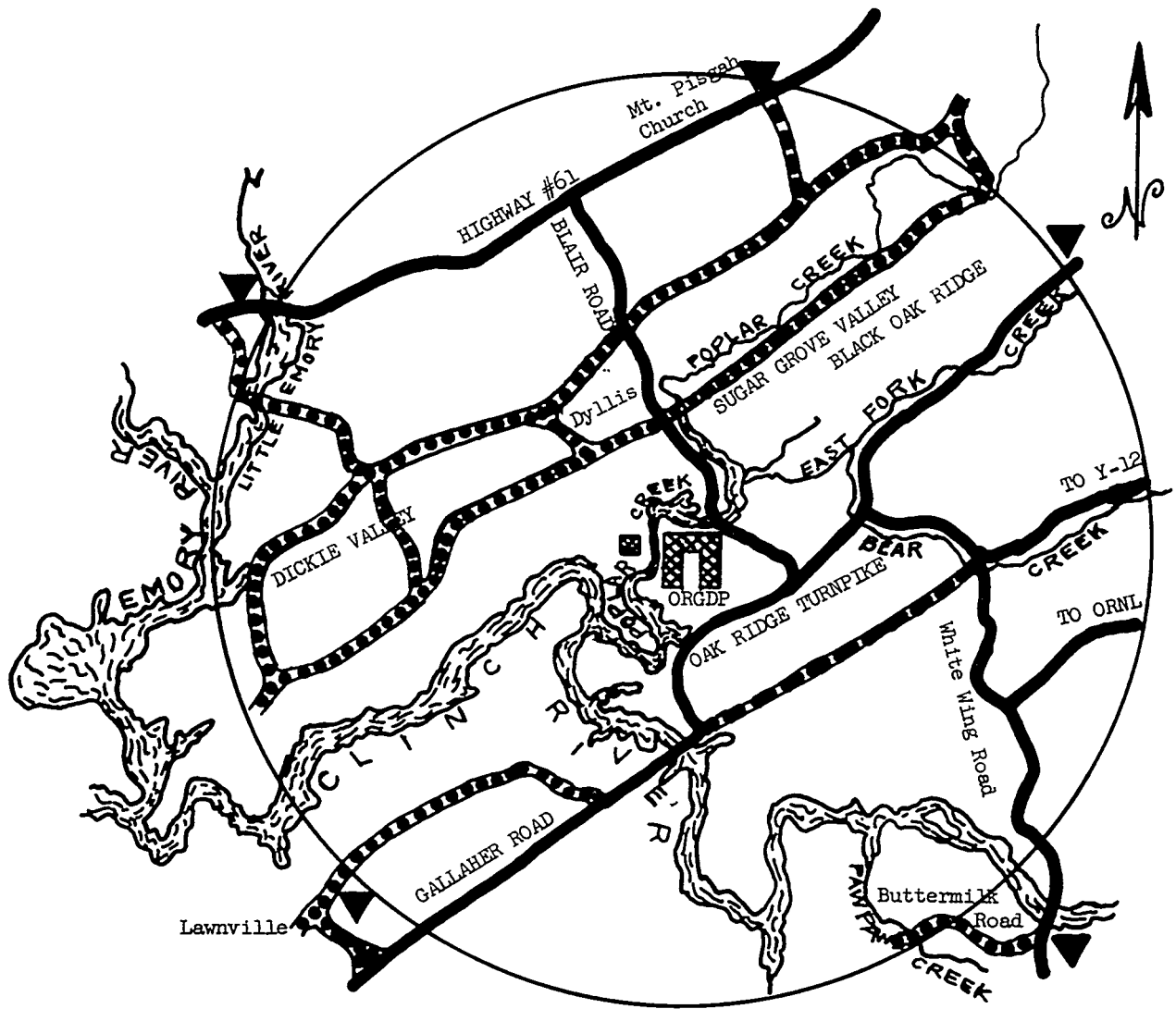


Figure 1



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

AIR

▼ Sampling Location - Five Miles from Plant

Figure 3

controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

Analyses are made of the effluent for the long-lived radionuclides only since cooling time and hold-up time in the waste effluent system is such that short lived radionuclides are not present. The fraction of the activity comprised by each isotope is determined from the analyses. A weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

Gamma Measurements

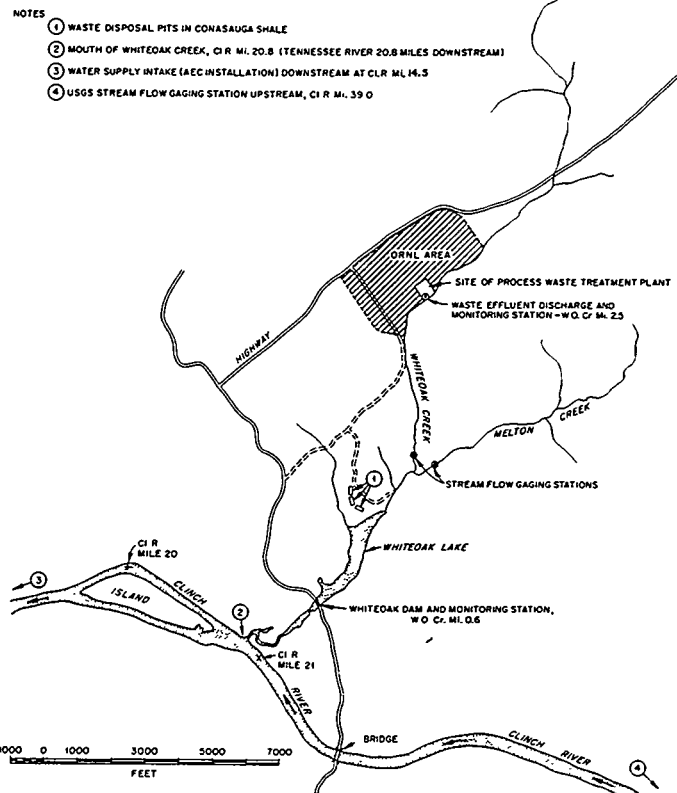
External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Muller tube at a distance of three feet aboveground, and the results are tabulated in terms of mr/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the fourth quarter of 1961 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

The average air contamination levels for gross beta activity, as shown by the continuous air monitoring filter data for the immediate and remote environs of the plants, were 3.5% and 4.1%, respectively, of the maximum permissible concentration for populations in the neighborhood of a controlled area. These values are approximately 70% higher than those of last quarter

UNCLASSIFIED
ORNL-LR-DR-20408



Location Sketch Map
ORNL Area Surface Drainage

Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R1

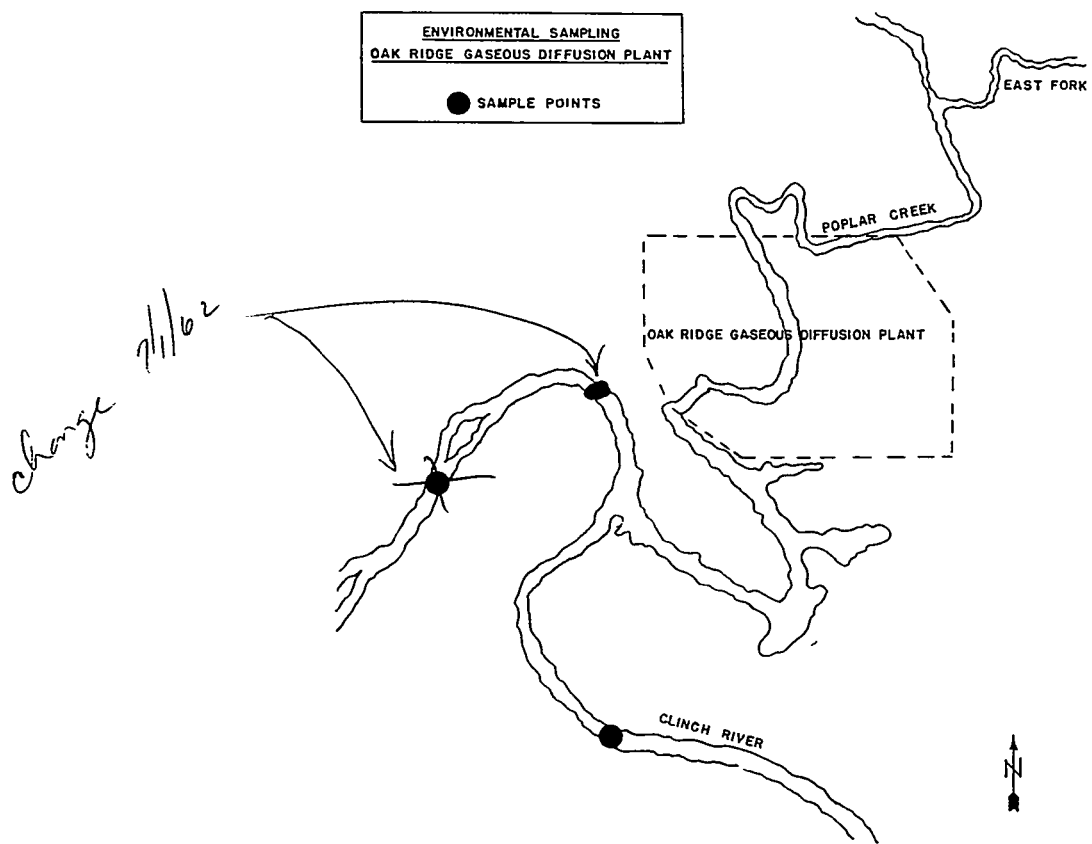


Figure 5

but are no greater than the average of those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network for the first two months of this quarter.

The average air-borne alpha activity in the environs of the ORGDP, five miles from ORGDP, was 12% of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of most of the wastes, and at Mile 4.5, near Kingston, Tennessee, were 5.2×10^{-7} $\mu\text{c/cc}$ and 2.4×10^{-7} $\mu\text{c/cc}$ respectively. These values are 8.8% and 5.5% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 0.7×10^{-11} $\mu\text{c/cc}$ which is 0.0001% of the weighted average (MPC)_w value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all Oak Ridge Plants, was only 0.01% of the (MPC)_w for uranium.

External gamma radiation in the Oak Ridge Area averaged 0.02 mr/hr. This level is not significantly different from the average of the levels measured throughout the United States by the U. S. Public Health Service Surveillance Network.

Conclusion

The air and ground contamination in both the immediate and remote environs of Oak Ridge was influenced by fall-out from sources other than local plant operations. From analysis of the data taken, it is concluded that the Oak Ridge Operations contributed little to the air or ground contamination found in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes from local operations, the resulting concentrations in the river are well below the maximum permissible concentration recommended by the NCRP for populations in the neighborhood of an atomic energy installation.

TABLE I
CONTINUOUS AIR MONITORING DATA
Long-Lived Fission Products

Fourth Quarter, 1961

| Station Number | Location | Number of Samples Taken | Units of 10^{-13} $\mu\text{c/cc}$ | | | % of (MPC) _a * |
|---------------------------|--------------------|-------------------------|--------------------------------------|---------|---------|---------------------------|
| | | | Maximum | Minimum | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-11 | Kerr Hollow Gate | 13 | 49 | 16 | 32 | 3.2 |
| HP-12 | Midway Gate | 13 | 69 | 18 | 37 | 3.7 |
| HP-13 | Gallaher Gate | 13 | 66 | 16 | 35 | 3.5 |
| HP-14 | White Oak Dam | 13 | 55 | 16 | 32 | 3.2 |
| HP-15 | Blair Gate | 13 | 73 | 20 | 40 | 4.0 |
| HP-16 | Turnpike Gate | 13 | 53 | 17 | 34 | 3.4 |
| HP-17 | Hickory Creek Bend | 13 | 56 | 17 | 36 | 3.6 |
| Average | | | | | 35 | 3.5 |
| <u>Remote Stations</u> | | | | | | |
| HP-19 | Norris Dam | 13 | 67 | 18 | 41 | 4.1 |
| HP-20 | Loudoun Dam | 13 | 73 | 18 | 38 | 3.8 |
| HP-21 | Douglas Dam | 13 | 88 | 15 | 43 | 4.3 |
| HP-22 | Cherokee Dam | 13 | 65 | 18 | 41 | 4.1 |
| HP-23 | Watts Bar Dam | 13 | 75 | 21 | 44 | 4.4 |
| HP-24 | Great Falls Dam | 13 | 77 | 17 | 46 | 4.6 |
| HP-25 | Dale Hollow Dam | 13 | 58 | 22 | 37 | 3.7 |
| HP-26 | Berea, Kentucky | 13 | 51 | 19 | 34 | 3.4 |
| Average | | | | | 41 | 4.1 |

* (MPC)_a is taken to be 10^{-10} $\mu\text{c/cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA

Fourth Quarter, 1961

| Distance from Center of Plant | Type of Analyses | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | | (MPC)a | % (MPC)a |
|----------------------------------|---------------------|-------------------|--------------------------------------|------|-------|------|---------|----|--------|----------|
| | | | Direction from Plant | | | | Average | | | |
| | | | North | East | South | West | | | | |
| 5-Mile Radius* | Gross Alpha | 592 | 3.0 | 1.6 | 2.6 | 1.8 | 2.4 | 20 | 12.0 | |

* Normal Sampling Frequency: Continuous

TABLE III

CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

Fourth Quarter, 1961

| Number of Samples Taken | Units of 10^{-7} $\mu\text{c/cc}$ | | | % of $(\text{MPC})_w$ |
|----------------------------|-------------------------------------|---------|---------|-----------------------|
| | Maximum | Minimum | Average | |
| 91 | 27.0 | 0.27 | 5.2 | 8.8 |

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

Fourth Quarter, 1961

| Location | Units of 10^{-8} $\mu\text{c/cc}$ | | | | | | % of (MPC) _w |
|-----------------------|-------------------------------------|-------------------|-------------------|-----------------------|------------------|--------------------------------|---------------------------------|
| | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | Average Gross Beta Activity | (MPC) _w ^a |
| Mi. 33.2 | 0.08 | 0.04 | 0.05 | 0.9 | 0.06 | 0.28 | 128 |
| Mi. 20.8 ^b | 0.28 | 0.10 | 0.25 | 37 | 0.30 | 52 | 590 |
| Mi. 4.5 | 0.33 | 0.18 | 0.09 | 21 | 0.36 | 24 | 427 |
| | | | | | | | 0.22 |
| | | | | | | | 8.8 |
| | | | | | | | 5.5 |

^a Weighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on levels of waste released and the dilution afforded by the river.

TABLE V
URANIUM CONCENTRATION IN THE CLINCH
RIVER
Fourth Quarter, 1961

| Sampling Point | Type of Analyses Made | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | % (MPC) _w |
|-----------------------|-----------------------|----------------|-------------------------------------|---------|---------|----------------------|
| | | | Maximum | Minimum | Average | |
| Upstream from ORGDP | Uranium Concentration | 13 | 0.56 | 0 | 0.11 | < 0.01 |
| Downstream from ORGDP | Uranium Concentration | 12 | 0.70 | 0 | 0.23 | 0.01 |

Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS
mr/hr

Fourth Quarter, 1961

| Station Number | Location | October | November | December | Average |
|----------------|-------------------------|---------|----------|----------|---------|
| 1 | Solway Gate | 0.015 | 0.026 | 0.021 | 0.021 |
| 2 | Y-12 East Portal | 0.015 | 0.021 | 0.020 | 0.019 |
| 3 | Newcomb Road, Oak Ridge | 0.016 | 0.022 | 0.021 | 0.020 |
| 4 | Gallaher Gate | 0.019 | 0.025 | 0.025 | 0.023 |
| 5 | White Wing Gate | 0.017 | 0.021 | 0.018 | 0.019 |
| Average | | 0.016 | 0.023 | 0.021 | 0.020 |

cc: J.B. Scott



INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

| | | | |
|-----------|--|-----------------------|--|
| To (Name) | Mr. J. C. Hart | Date | January 11, 1962 |
| Company | | Originating Dept. | |
| Location | ORNL | Answering letter date | |
| Copy to | Mr. E. W. Bahler Mr. J. P. Murray Mr. W. L. Richardson Safety and Health Physics Files RC ✓ | Subject | News Release on Environmental Surveys |

Attached are data for the quarterly news release as requested by the AEC-ORNL, covering environmental surveys made at off-plant locations during the fourth quarter of 1961.

APH:la

Attachment


A. P. Huber

For Immediate Release

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
OCTOBER THROUGH DECEMBER, 1961

The results of sampling by the Oak Ridge Gaseous Diffusion Plant during the fourth quarter of 1961 revealed that the amount of uranium in the streams adjacent to the plant and in the air out as far as five miles is not significantly different from the normal background values established for this region.

The average air-borne alpha activity at sampling locations on a five-mile radius from the plant increased slightly during the quarter, but continued to be only a small fraction of the maximum permissible concentration for the general population adjacent to AEC installations. Environmental air sampling data are shown in Table 1 and the continuous sampling points in Figure 1.

Continuous sampling of the surface waterways adjacent to the plant revealed no instances where the uranium concentration exceeded the maximum permissible concentration specified for water MPC_w.^{*} The average activity of natural uranium materials in the Clinch River reflecting the effects of all of the Oak Ridge Plants was only 0.01% of the MPC_w. Sampling data are shown in Table 2 and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements at five locations surrounding the ORGDP Area averaged 0.020 mr/hour. This is the same as the average background levels obtained throughout the United States by the U. S. Public Health Services Radiation Surveillance Network, employing similar methods and detection instruments.

* National Bureau of Standards Handbook No. 69, Maximum permissible concentrations in water for populations adjacent to AEC installations based on a 168-hour continuous exposure to natural uranium.

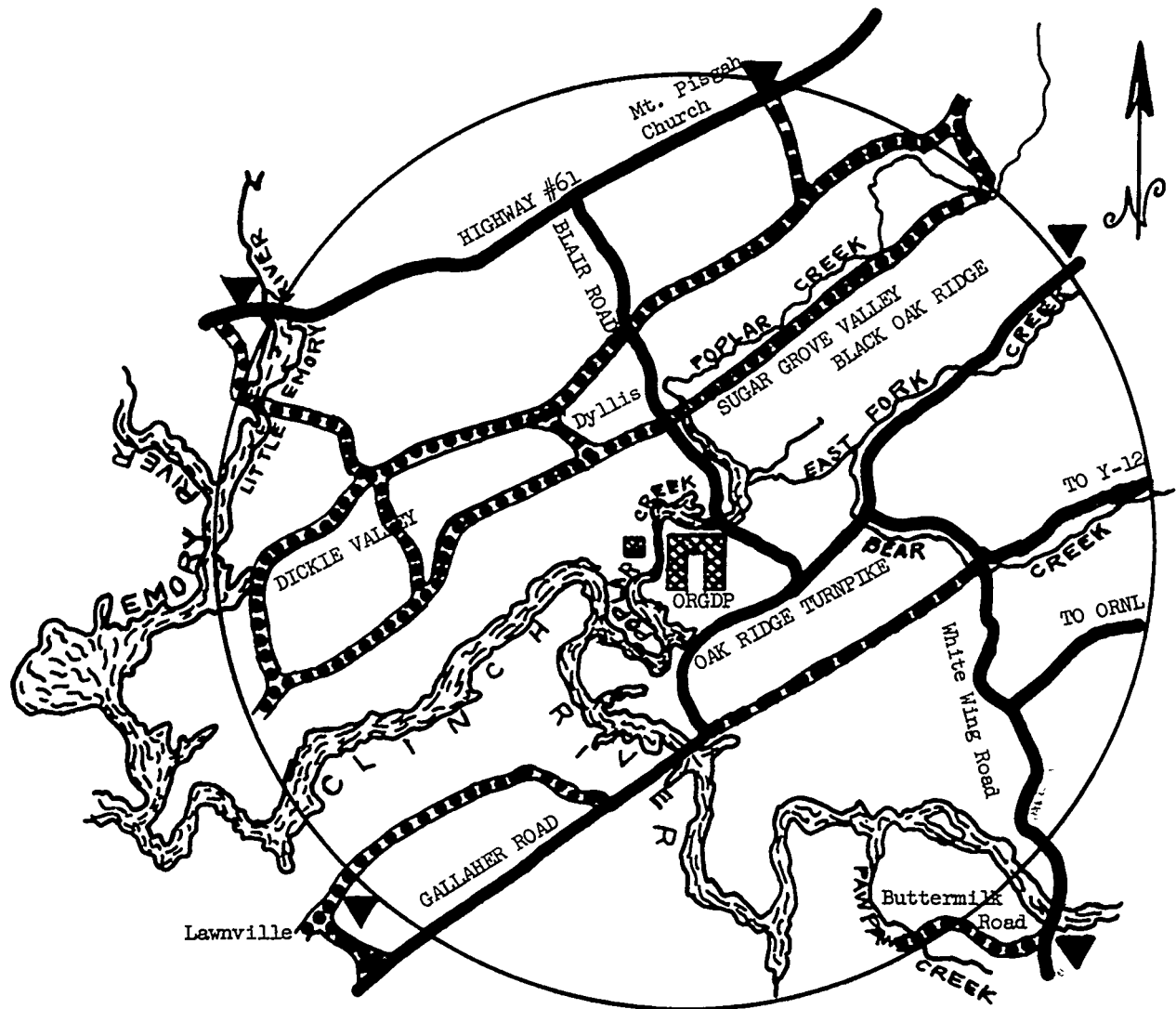
Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant
January 10, 1962

TABLE 1
 ENVIRONMENTAL SAMPLING - AIR
 OAK RIDGE GASEOUS DIFFUSION PLANT

| Period: <u>October-December, 1961</u> | | | | | | |
|---------------------------------------|--------------------------|-------------------|--------------------------------------|-------------|----------------------------------|-------------------|
| Distance from Center of Plant | Type of Analysis Made | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | Average % MPCa |
| | | | Direction from Plant | | Max. Permissible Conc. (MPC)a | |
| | | | N | E S W | Av. | |
| 5-Mile Radius* | Gross Alpha | 592 | 3.0 | 1.6 2.6 1.8 | 2.4 | 20 |
| | | | | | | 12.0 |

* Normal Sampling Frequency: Continuous.

January 10, 1962



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

AIR



Sampling Location - Five Miles from Plant

FIGURE 1

TABLE 2
ENVIRONMENTAL SAMPLING - LOCAL STREAMS
OAK RIDGE GASEOUS DIFFUSION PLANT

| Period: <u>October-December, 1961</u> | | Units of 10^{-8} $\mu\text{c/cc}$ | | | | |
|---------------------------------------|-------------------------|-------------------------------------|-------------------------|------------|--|----------------------------------|
| <u>Location of Point*</u> | <u>Type of Analysis</u> | <u>No. of Samples</u> | <u>Plant Experience</u> | | <u>Maximum Permissible (MPC)_W</u> | <u>Average % MPC_W</u> |
| | | | <u>High</u> | <u>Low</u> | | |
| Upstream | Uranium Concentration | 13 | 0.56 | 0 | 2000 | < 0.01 |
| Downstream | Uranium Concentration | 12 | 0.70 | 0 | 2000 | 0.01 |

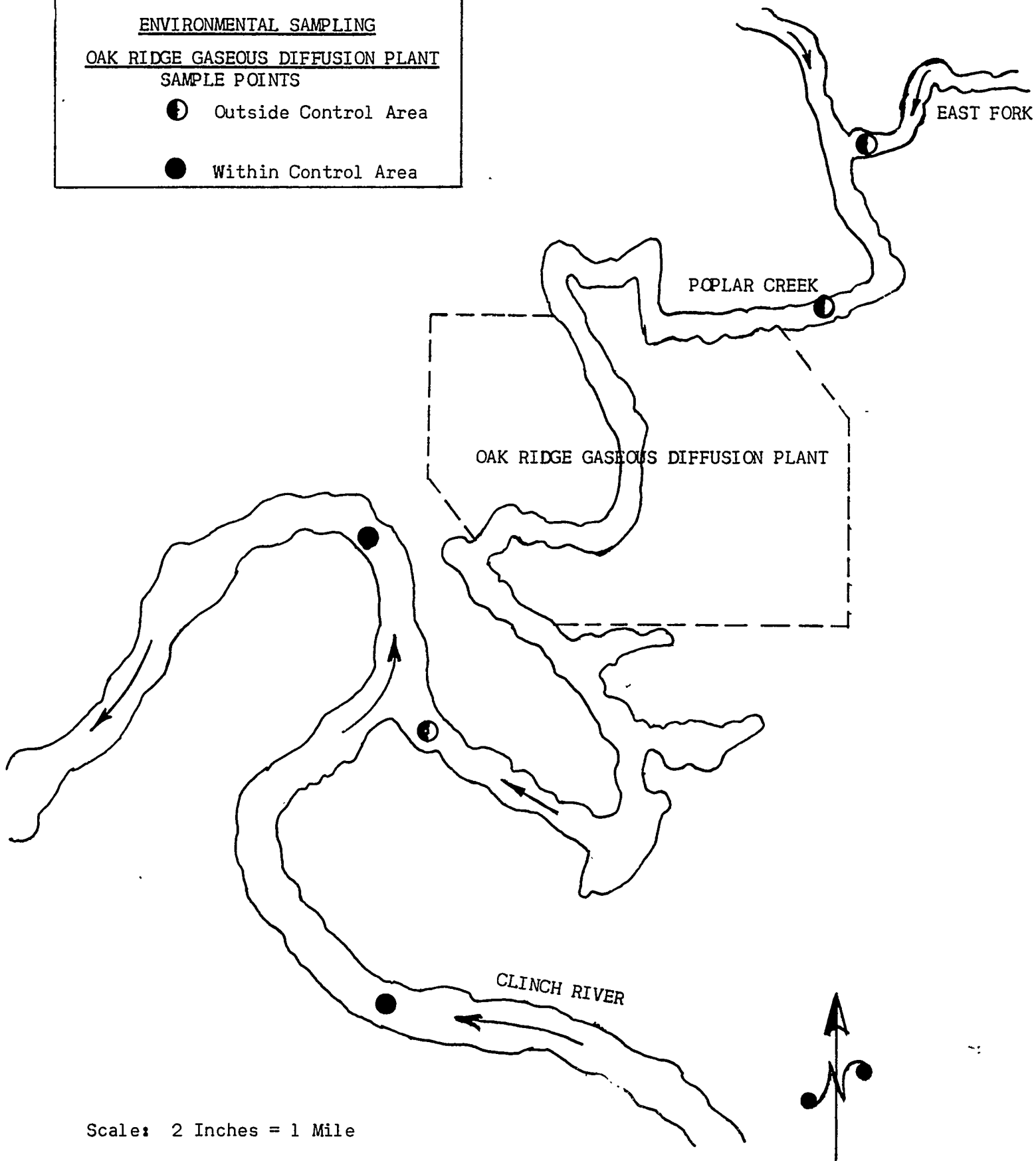
*Normal Sampling Frequency: Continuous, composited over one week.

ENVIRONMENTAL SAMPLING

OAK RIDGE GASEOUS DIFFUSION PLANT
SAMPLE POINTS

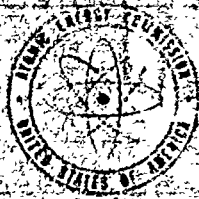
① Outside Control Area

● Within Control Area



Scale: 2 Inches = 1 Mile

Figure 2



UNITED STATES
ATOMIC ENERGY COMMISSION

Copy forwarded by
W. L. RICHARDSON

IN REPLY, REFERENCE TO DGC 10-11-3-04

ORB:JAL

Oak Ridge, Tennessee
October 13, 1961

Union Carbide Nuclear Company
Post Office Box P
Oak Ridge, Tennessee

Attention: Dr. C. E. Larson, Vice President

Subject: ENVIRONMENTAL RADIOACTIVITY MONITORING REPORTS - SOURCES
AND LEVELS OF ENVIRONMENTAL ACTIVITY

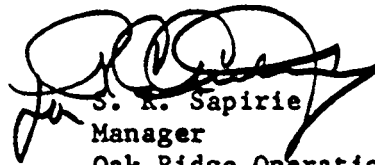
Gentlemen:

Reference is made to our letter dated September 20, 1961, concerning the above subject.

Original criteria for the preparation of environmental monitoring reports required that "no reference to foreign activities be contained". In view of the current possibility that foreign sources of radioactivity may affect environmental measurements, it is requested that your installations delineate, if feasible, the sources of radioactivity recorded by their environmental measurements. No special or extensive analyses should be undertaken for this purpose. However, if measurements are obviously being affected by other sources, note should be taken of this fact.

Your cooperation in this matter will be appreciated.

Very truly yours,


S. R. Sapirie
Manager
Oak Ridge Operations

CC: R. C. Armstrong
H. M. Roth

UNION CARBIDE NUCLEAR COMPANY •

DIVISION OF

UNION
CARBIDE

CORPORATION

POST OFFICE BOX P. OAK RIDGE, TENNESSEE

November 13, 1961

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie

Gentlemen:

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON
ENVIRONMENTAL LEVELS OF RADIOACTIVITY

As requested, we are enclosing eighty copies of the report for the third quarter, 1961, on Environmental Levels of Radioactivity for the Oak Ridge Area.

Yours very truly,

UNION CARBIDE NUCLEAR COMPANY

AP/Larson
for C. E. Larson
Vice President

CEL:KZM:dw
Enclosures

cc w/encls.: F. R. Bruce
F. L. Culler
J. C. Hart (10)
W. H. Jordan
K. Z. Morgan
ORGDP, Safety and Health
Department (2)
J. A. Swartout (2)
J. P. Murray (4)

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

(Report for Third Quarter 1961)

Compiled by the
Applied Health Physics Section
Health Physics Division
OAK RIDGE NATIONAL LABORATORY

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to pits located in the Conasauga shale formation. Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

Air Monitoring

Atmospheric contamination by long-lived fission products and fall-out occurring in the general environment of East Tennessee are monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of eight stations encircling the Oak Ridge Area at distances of from 12 to 120 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c/cc}$ of air sampled.

Atmospheric contamination by uranium is determined by taking periodic air samples at eight locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are

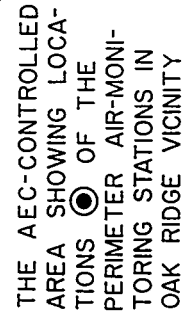
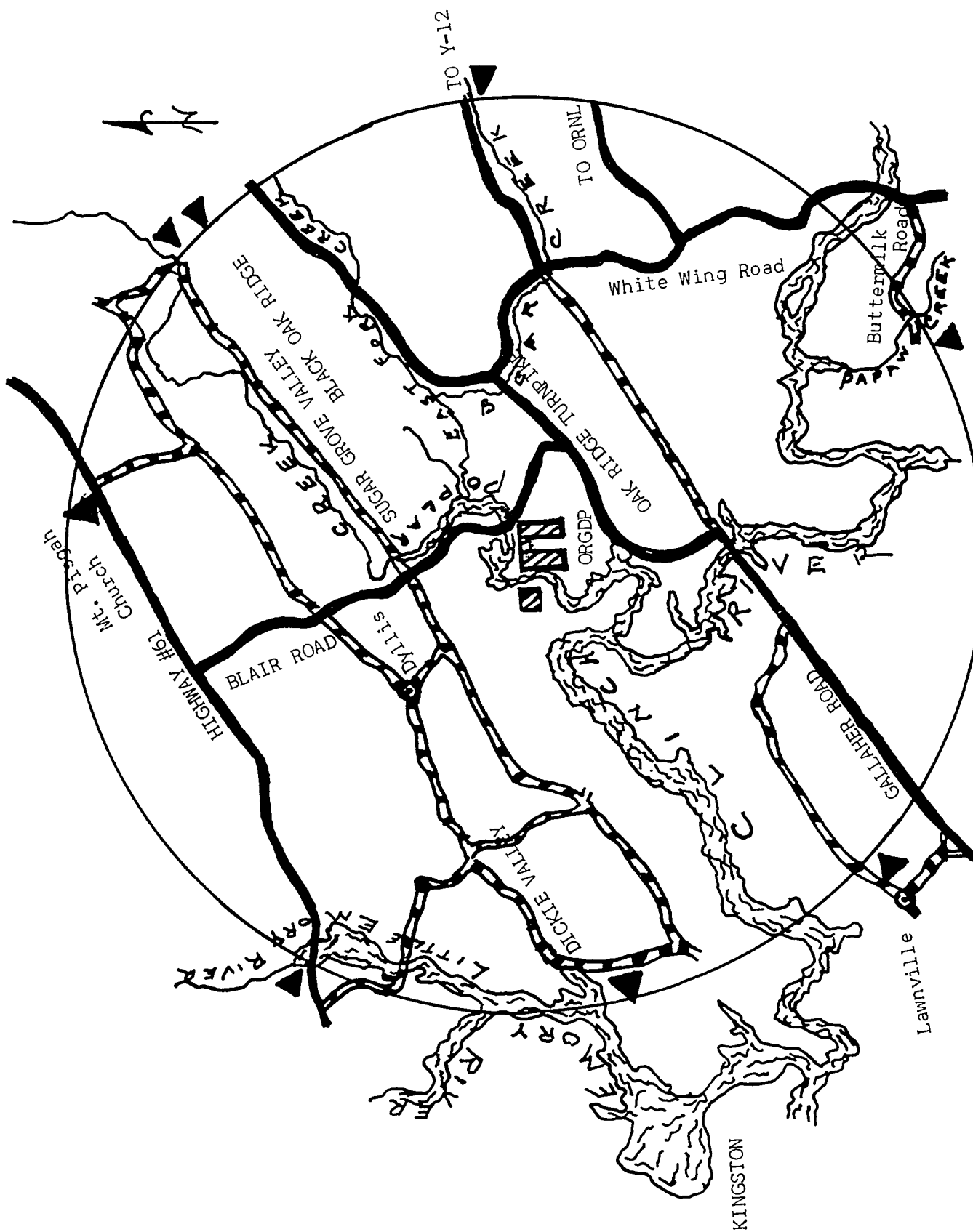


Figure 1

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

▲ Sampling Location - 5 Miles from Plant

Figure 3

controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

The fraction of the total beta activity comprised by each isotope is determined from analysis of long-lived radionuclides contained in the effluent and a weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

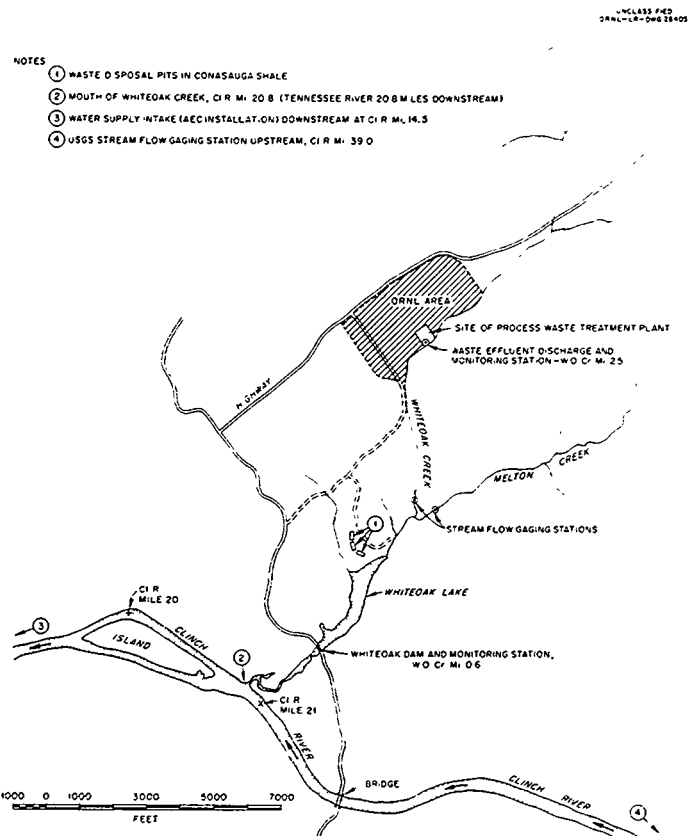
Gamma Measurements

External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Muller tube at a distance of three feet aboveground, and the results are tabulated in terms of mr/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the third quarter of 1961 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

The average air contamination levels for gross beta activity, as shown by the continuous air monitoring filter data for the immediate and remote environs of the plants, were 2.1% and 2.4%, respectively, of the maximum permissible concentration for populations in the neighborhood of a controlled area. These values are higher by a factor of approximately 20 than those of



Location Sketch Map
ORNL Area Surface Drainage

Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R1

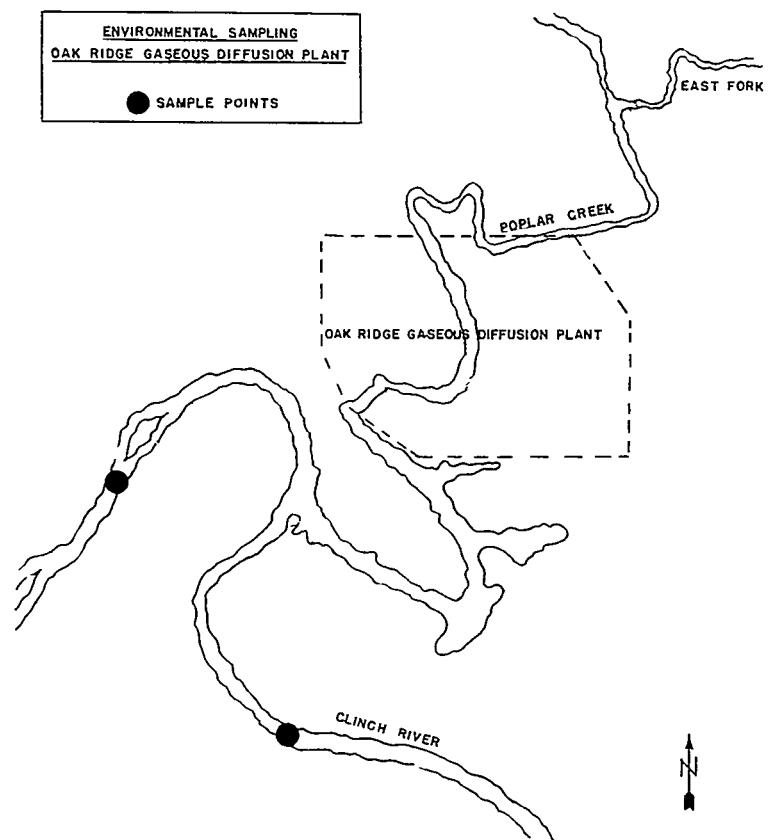


Figure 5

last quarter. The increase is attributed to weapons test fall-out which began arriving in the Oak Ridge Area on September 17, 1961. The air contamination collected on the filters was identified by gamma spectrometry as mixed fission products such as might be expected from weapons tests.

External gamma radiation in the Oak Ridge Area averaged 0.019 mr/hr for the quarter. While this value is only slightly higher than that of last quarter, the background for the month of September was approximately double the average for July and August. The time of this increase coincides with the arrival of weapons test fall-out.

The average air-borne alpha activity in the environs of the ORGDP, five miles from the plant, was 2.3% of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of most of the wastes, and at Mile 4.5, near Kingston, Tennessee, were 1.7×10^{-7} $\mu\text{c/cc}$ and 0.92×10^{-7} $\mu\text{c/cc}$ respectively. These values are 6.3% and 3.1% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 8.1×10^{-11} $\mu\text{c/cc}$ which is 0.003% of the weighted average (MPC)_w value.

The average activity of natural uranium materials in the Clinch River reflecting the effects of all Oak Ridge Plants, was only 0.01% of the (MPC)_w for uranium.

Conclusion

The air and ground contamination in the immediate and remote environs of Oak Ridge increased during this quarter. The contamination was identified as originating from sources other than local plant operations. From analysis of the data taken it is concluded that the Oak Ridge operations contributed little to the air or ground contamination found in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes, the concentrations in the river are well below the maximum permissible concentration recommended by the NCRP for populations in the neighborhood of an atomic energy installation.

TABLE I
CONTINUOUS AIR MONITORING DATA
Long-Lived Fission Products

Third Quarter, 1961

| Station Number | Location | Number of Samples Taken | Units of 10^{-13} $\mu\text{c/cc}$ | | | % of (MPC) _a * |
|---------------------------|--------------------|-------------------------|--------------------------------------|---------|---------|---------------------------|
| | | | Maximum | Minimum | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-11 | Kerr Hollow Gate | 14 | 144 | 0.31 | 20.5 | 2.1 |
| HP-12 | Midway Gate | 14 | 148 | 0.25 | 21.8 | 2.2 |
| HP-13 | Gallaher Gate | 14 | 130 | 0.12 | 19.8 | 2.0 |
| HP-14 | White Wing Gate | 14 | 154 | 0.07 | 16.5 | 1.7 |
| HP-15 | Blair Gate | 14 | 145 | 0.10 | 20.9 | 2.1 |
| HP-16 | Turnpike Gate | 14 | 116 | 0.17 | 19.0 | 1.9 |
| HP-17 | Hickory Creek Bend | 14 | 157 | 0.07 | 22.8 | 2.3 |
| Average | | | | | 20.9 | 2.1 |
| <u>Remote Stations</u> | | | | | | |
| HP-19 | Norris Dam | 14 | 175 | 0.11 | 22.8 | 2.3 |
| HP-20 | Loudoun Dam | 14 | 172 | 0.27 | 26.6 | 2.7 |
| HP-21 | Douglas Dam | 14 | 185 | 0.13 | 23.1 | 2.3 |
| HP-22 | Cherokee Dam | 14 | 144 | 0.28 | 20.4 | 2.0 |
| HP-23 | Watts Bar Dam | 14 | 208 | 0.28 | 31.0 | 3.1 |
| HP-24 | Great Falls Dam | 14 | 220 | 0.29 | 30.0 | 3.0 |
| HP-25 | Dale Hollow Dam | 14 | 137 | 0.07 | 17.2 | 1.7 |
| HP-26 | Berea, Kentucky | 14 | 166 | 0.08 | 17.9 | 1.8 |
| Average | | | | | 23.6 | 2.4 |

* (MPC)_a is taken to be 10^{-10} $\mu\text{c/cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA
URANIUM

Third Quarter, 1961

| Distance from Center of Plant | Type of Analyses | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | % (MPC)a | |
|----------------------------------|--------------------------|-------------------|--------------------------------------|------|-------|------|-------------------|----------|-----|
| | | | Direction from Plant: | | | | Average (MPC)a | | |
| | | | North | East | South | West | | | |
| 5-Mile Radius * | Uranium Concentration | 10 | 0.75 | 0.50 | 0.35 | 0.25 | 0.45 | 20 | 2.3 |

* Normal Sampling Frequency: Random sampling; 10 minute samples.

TABLE III
CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

Third Quarter, 1961

| Number of Samples Taken | Units of 10^{-7} $\mu\text{c/cc}$ | | | % of $(\text{MPC})_w$ |
|----------------------------|-------------------------------------|---------|---------|-----------------------|
| | Maximum | Minimum | Average | |
| 98 | 5.2 | .07 | 1.7 | 6.3 |

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

Third Quarter, 1961

| Location | Units of $10^{-8} \mu\text{c/cc}$ | | | | | | % of (MPC) _w |
|-----------------------|-----------------------------------|-------------------|-------------------|-----------------------|------------------|--------------------------------|---------------------------------|
| | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | Average Gross Beta Activity | (MPC) _w ^a |
| Mi. 33.2 | 0.10 | 0.05 | * | 0.45 | * | 0.30 | 28 |
| Mi. 20.8 ^b | 0.23 | 0.02 | 0.17 | 9.0 | 0.13 | 17 | 278 |
| Mi. 4.5 | 0.25 | 0.11 | 0.05 | 5.9 | 0.02 | 9.2 | 297 |
| | | | | | | | 1.1 |
| | | | | | | | 6.3 |
| | | | | | | | 3.1 |

^a Weighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on levels of waste released and the dilution afforded by the river.

* None detected.

TABLE V
URANIUM CONCENTRATION IN THE CLINCH
RIVER

Third Quarter, 1961

| Sampling Point | Type of Analyses Made | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | $\% \text{ (MPC)}_w$ |
|-----------------------|-----------------------|----------------|-------------------------------------|---------|---------|----------------------|
| | | | Maximum | Minimum | Average | |
| Upstream from ORGDP | Uranium Concentration | 14 | 0.56 | 0 | 0.18 | 2000 |
| Downstream from ORGDP | Uranium Concentration | 13 | 0.56 | 0 | 0.27 | 2000 |

Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS

mr/hr

Third Quarter, 1961

| Station Number | Location | July | August | September | Average |
|----------------|-------------------------|-------|--------|-----------|---------|
| 1 | Solway Gate | 0.013 | 0.014 | 0.018 | 0.015 |
| 2 | Y-12 East Portal | 0.014 | 0.016 | 0.025 | 0.018 |
| 3 | Newcomb Road, Oak Ridge | 0.013 | 0.016 | 0.023 | 0.017 |
| 4 | Gallaher Gate | 0.013 | 0.017 | 0.039 | 0.023 |
| 5 | White Wing Gate | 0.013 | 0.017 | 0.033 | 0.021 |
| Average | | 0.013 | 0.016 | 0.028 | 0.019 |

cc: J. B. Scott



INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name)
Company
Location

Mr. J. C. Hart

ORNL

Date

October 16, 1961

Originating Dept.

Answering letter date

Copy to

Mr. K. W. Bahler

Mr. J. P. Murray

Mr. W. L. Richardson

Safety and Health Physics Files RC ✓

Subject

News Release on
Environmental Surveys

Attached are data for the quarterly news release as requested by the AEC-ORO, covering environmental surveys made at off-plant locations during the third quarter of 1961.

APH:la

Attachment

A handwritten signature in cursive script, appearing to read "A. P. Huber", written over a horizontal line.
A. P. Huber

For Immediate Release

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JULY THROUGH SEPTEMBER, 1961

The results of sampling by the Oak Ridge Gaseous Diffusion Plant during the third quarter of 1961 revealed that the amount of uranium in the streams adjacent to the plant and in air out as far as five miles is not significantly different from the normal background values established for this region.

The average air-borne alpha activity at sampling locations on a five-mile radius from the plant decreased during the quarter and continued to be only a small fraction of the maximum permissible concentration for the general population adjacent to AEC installations. Environmental air sampling data are shown in Table 1 and the sampling points in Figure 1.

Continuous sampling of waterways adjacent to the plant revealed no instances where the uranium concentration exceeded the specified maximum permissible concentration for water $(MPC)_w$.^{*} The average activity of natural uranium materials in the Clinch River reflecting the effects of all the Oak Ridge Plants was only 0.01% of the $(MPC)_w$. Sampling data are shown in Table 2, and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements obtained at five locations surrounding the ORGDP Area averaged 0.020 mr/hr. This is the same as the average background levels obtained throughout the United States by the U. S. Public Health Service Radiation Surveillance Network, employing similar methods and detection instruments.

* National Bureau of Standards Handbook No. 69, Populations adjacent to AEC installations based on a 168-hour continuous exposure to natural uranium.

Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant
October 16, 1961

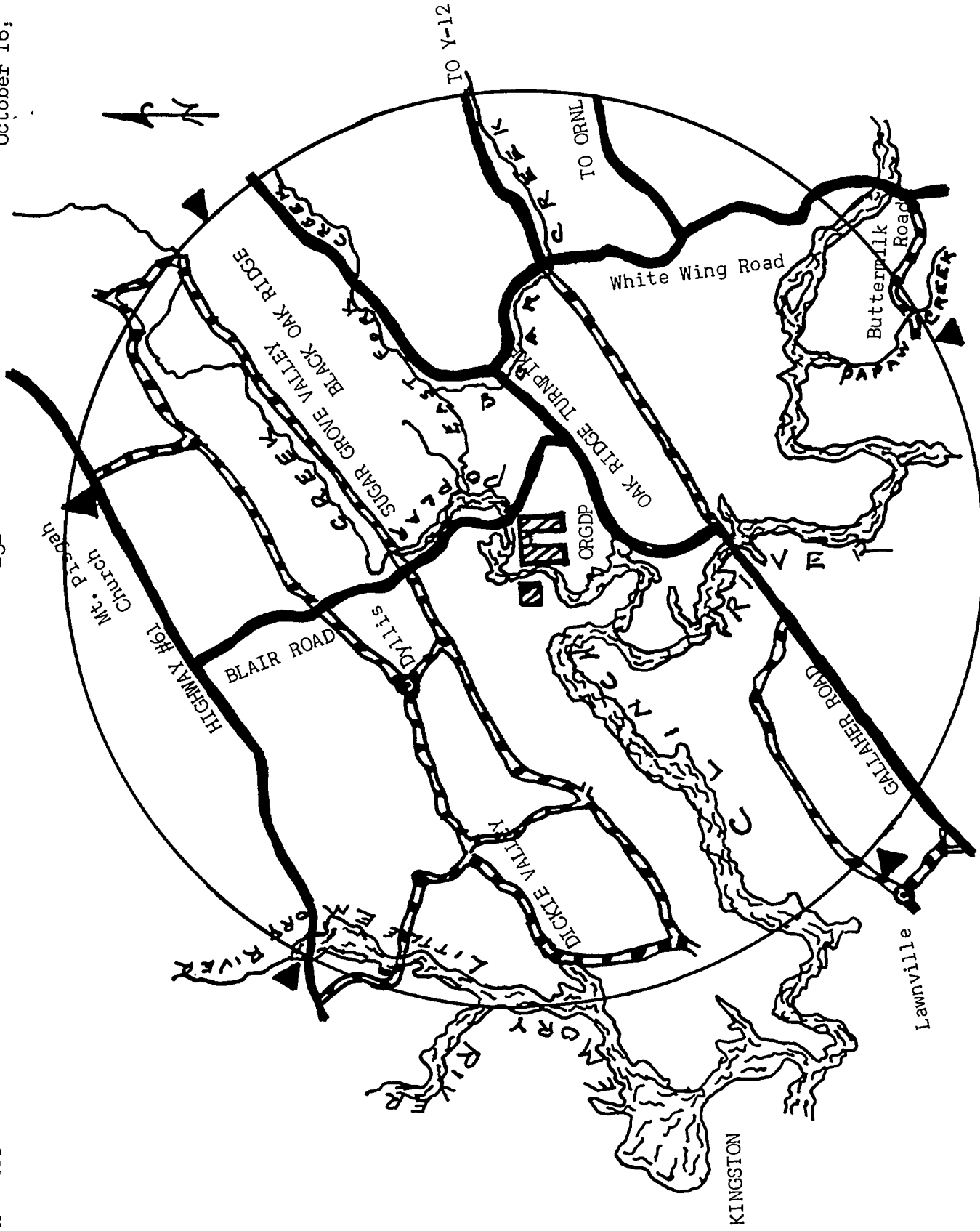
October 16, 1961

Table 1

ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

| Period: <u>July - September, 1961</u> | | No. of Samples | Concentration ($\mu\text{c/cc} \times 10^{-13}$) | | | | | Average Conc./ (MPC) a | |
|--|----------------------------------|-------------------|--|----------|----------|------------|---|------------------------------|----------|
| <u>Distance from Center of Plant</u> | <u>Type of Analysis Made</u> | | <u>Direction from Plant</u> | | | <u>Av.</u> | <u>Max. Permissible Conc. (MPC) a</u> | | |
| | | | <u>N</u> | <u>E</u> | <u>S</u> | | | | <u>W</u> |
| 5-Mile Radius | Uranium Con- centration | 10 | 0.75 | 0.50 | 0.35 | 0.25 | 0.45 | 20 | 2.3% |

Normal Sampling Frequency: Random sampling; 10-minute samples.



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP
Air
▲ Sampling Location - 5 Miles from Plant

FIGURE 1

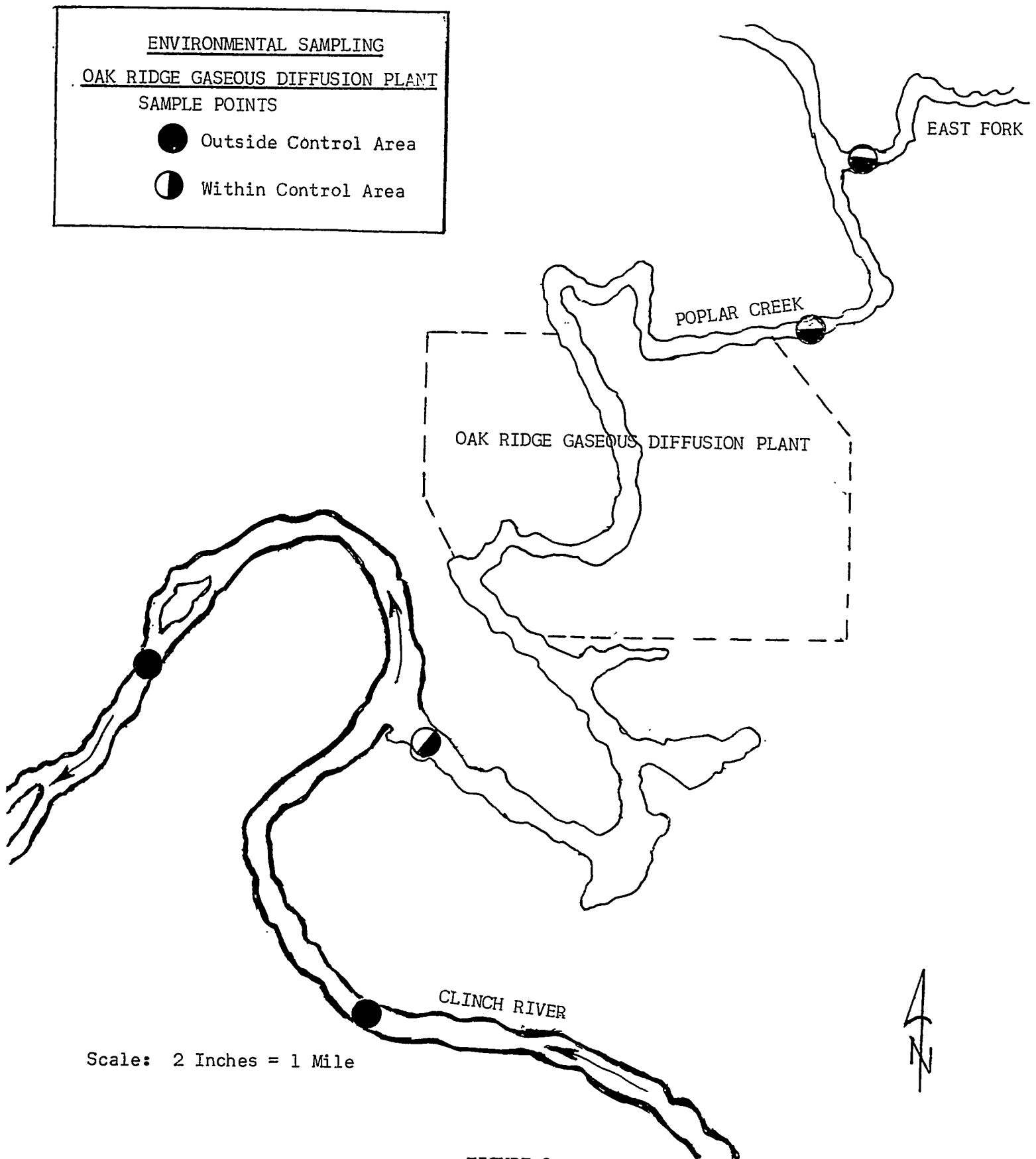
October 16, 1961

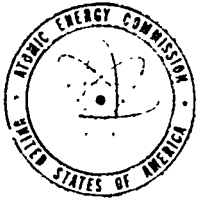
Table 2
 ENVIRONMENTAL SAMPLING - LOCAL STREAM
 OAK RIDGE GASEOUS DIFFUSION PLANT

| Period: <u>July - September, 1961</u> | | | | | |
|---------------------------------------|-------------------------|-----------------------|--|----------------------------|---------------------------|
| <u>Location of Point</u> | <u>Type of Analysis</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c}/\text{cc} \times 10^{-8}$)</u> | | |
| | | | <u>Plant Experience</u> | <u>Maximum Permissible</u> | <u>%(MPC)_w</u> |
| | | | <u>Low</u> | <u>High</u> | <u>Av.</u> |
| <u>Clinch River</u> | | | | | |
| Upstream | Uranium Concentration | 14 | 0 | 0.56 | 0.18 |
| | | | | | 2000 |
| Downstream | Uranium Concentration | 13 | 0 | 0.56 | 0.27 |
| | | | | | 2000 |
| | | | | | < 0.01 |
| | | | | | 0.01 |

Normal sampling frequency: Continuous, composited over one week.

October 16, 1961





UNITED STATES
ATOMIC ENERGY COMMISSION

Copy forwarded by

R.

IN REPLY REFER TO:

ORB:HH

Oak Ridge, Tennessee
September 20, 1961

cc: A. P. Huber
R. G. Jordan
R. A. Winkel

APH and RGJ will send reports to JAS for preparation of Oak Ridge report; Paducah will submit a separate report.

Union Carbide Nuclear Company
Post Office Box P
Oak Ridge, Tennessee

Attention: Mr. Logan B. Emlet, Vice President

JPM 9/25/61

Subject : DISSEMINATION TO THE PUBLIC OF DATA ON ENVIRONMENTAL LEVELS OF RADIOACTIVITY

Gentlemen:

Reference is made to my letter of January 12, 1960, suggesting quarterly release of reports on environmental levels of radioactivity to the public.

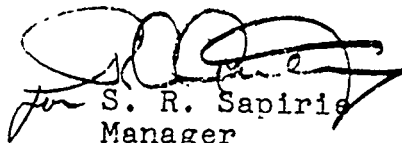
Our experience to date shows that semiannual reports will suffice in reporting environmental levels of radioactivity to the public. Therefore, beginning with the calendar year 1962 such reports should be submitted on a semiannual basis. The first report, covering the period of January 1 - June 30, 1962, will be due on July 20, 1962. The second report of each calendar year should include information for the second half of the year and also a summary of principal data for the entire year, since many of the radiation standards are based on yearly averages.

Reports should continue on a quarterly basis for the remainder of this calendar year. An annual report for 1961 should be prepared and may be combined with the fourth quarter 1961 report.

As in the past, 80 copies of these reports should be sent to this office for review and distribution.

Your cooperation in this matter will be appreciated.

Very truly yours,


S. R. Sapiro
Manager

Oak Ridge Operations

CC: R. C. Armstrong
H. M. Roth

Safety and Health
Physics

SEP 28 AM 9:22

UNION CARBIDE NUCLEAR COMPANY • DIVISION OF



CORPORATION

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

September 6, 1961

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie

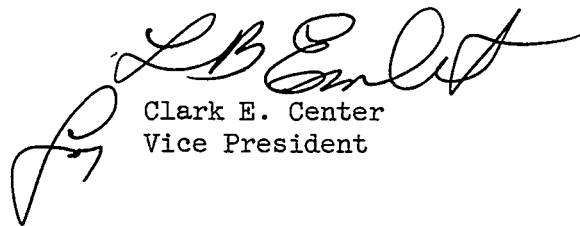
Gentlemen:

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON
ENVIRONMENTAL LEVELS OF RADIOACTIVITY

As requested, we are enclosing eighty copies of the report for the second quarter, 1961, on Environmental Levels of Radioactivity for the Oak Ridge Area.

Yours very truly,

UNION CARBIDE NUCLEAR COMPANY



Clark E. Center
Vice President

CEC:EDG:dw
Enclosures

cc w/encls.: F. R. Bruce
F. L. Culler
E. D. Gupton (10)
W. H. Jordan
K. Z. Morgan
ORGDP, Safety and Health
Department (2)
J. A. Swartout (2)
J. P. Murray (4)

Safety and Health
Physics

1:23

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

Report for Second Quarter 1961

Applied Health Physics Section
Health Physics Division
OAK RIDGE NATIONAL LABORATORY

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to pits located in the Conasauga shale formation. Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

Air Monitoring

Atmospheric contamination by long-lived fission products and fall-out occurring in the general environment of East Tennessee are monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of eight stations encircling the Oak Ridge Area at distances of from 12 to 120-miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c/cc}$ of air sampled.

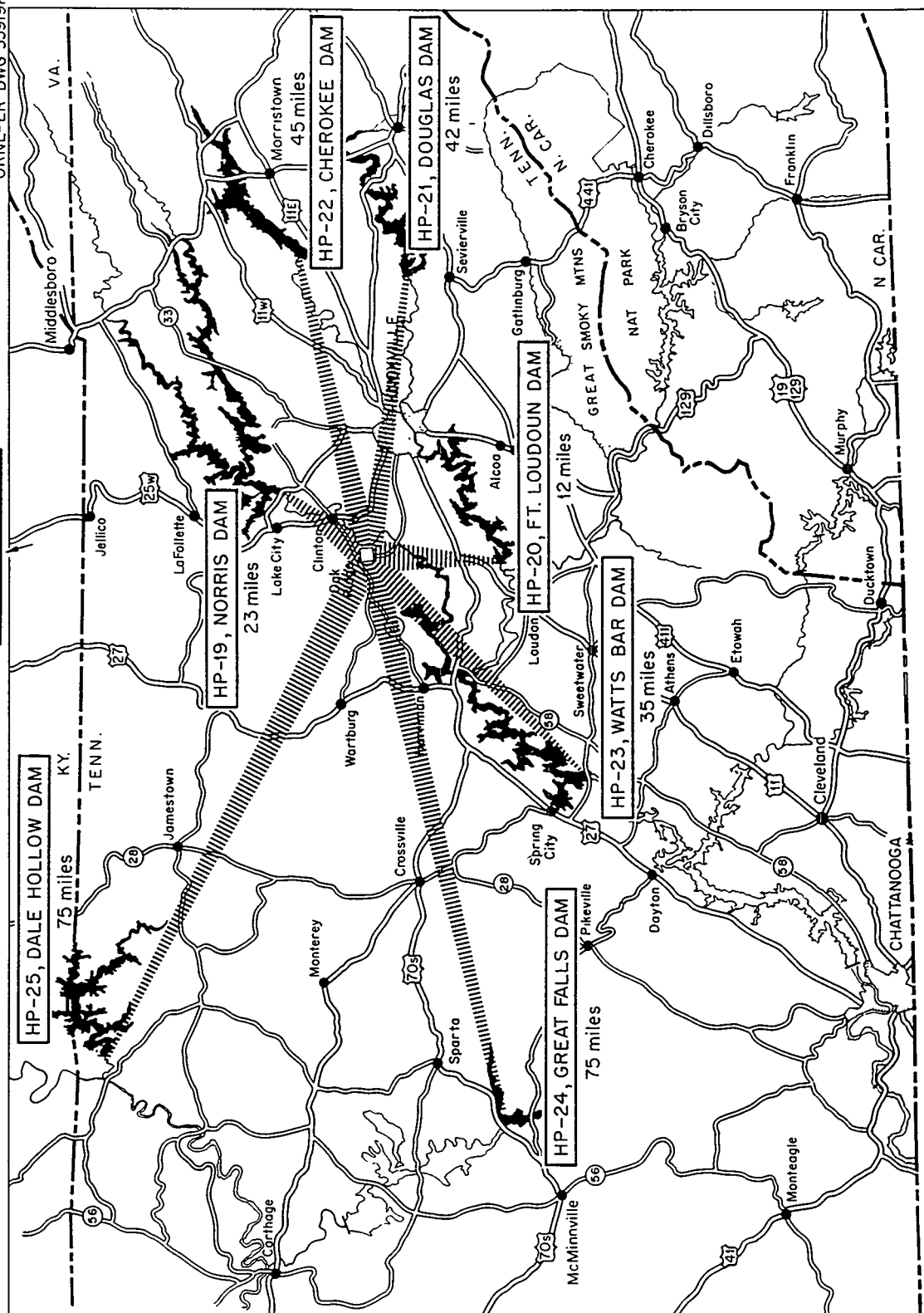
Atmospheric contamination by uranium is determined by taking periodic air samples at eight locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes

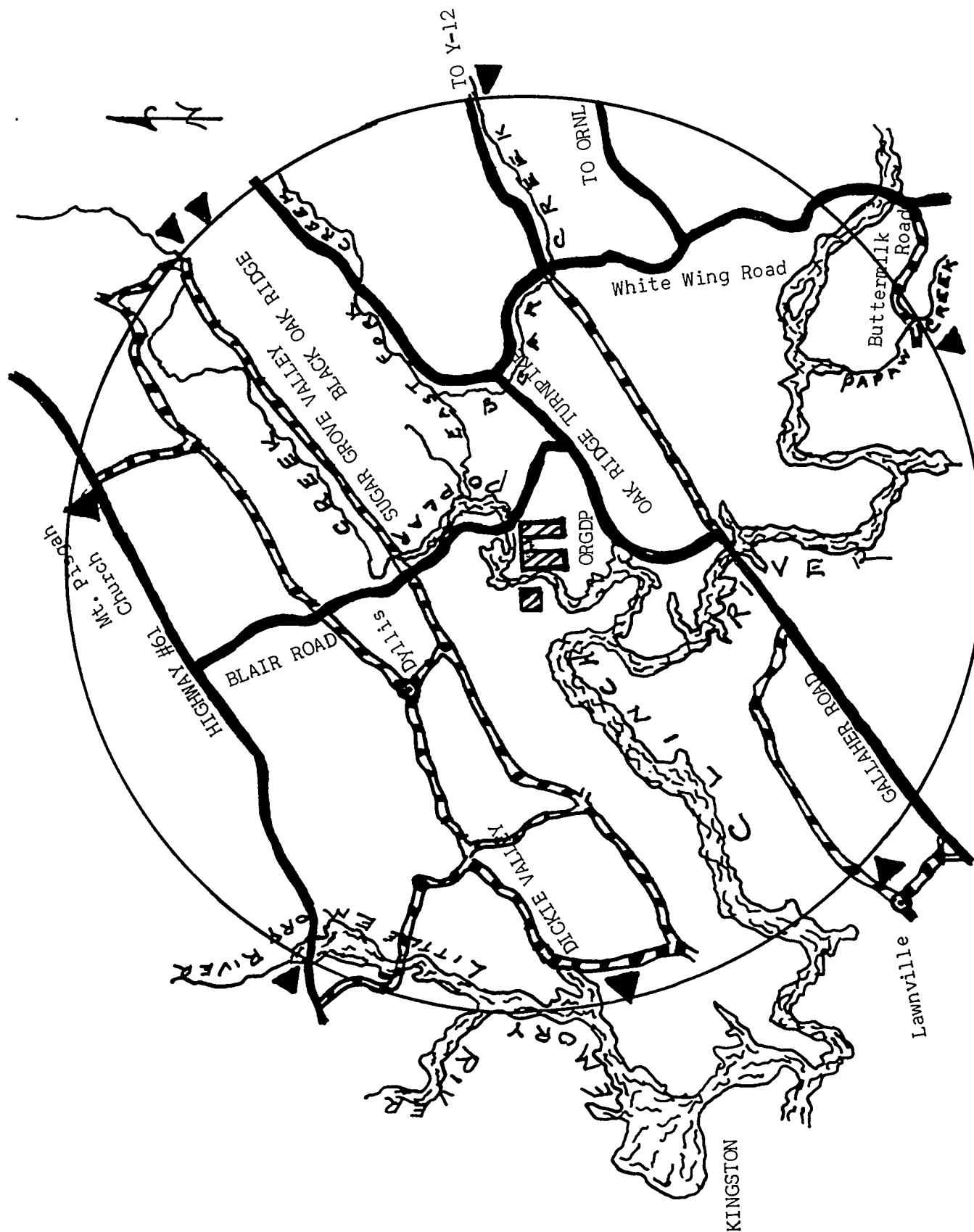


Figure 1



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



▲ SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

Air Sampling Location - 5 Miles from Plant

Figure 3

originating at the Oak Ridge Gaseous Diffusion Plant and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

The fraction of the total beta activity comprised by each isotope is determined from analysis of long-lived radionuclides contained in the effluent and a weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

Gamma Measurements

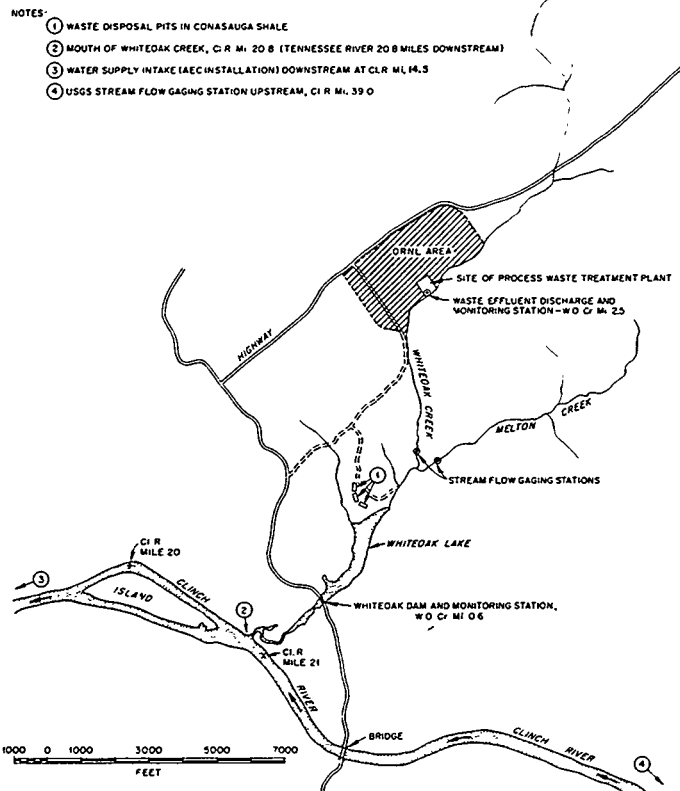
External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Muller tube at a distance of three feet aboveground, and the results are tabulated in terms of mr/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the second quarter of 1961 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

The average air contamination levels for gross β activity as shown by the continuous air monitoring filter data for the immediate and remote environs

UNCLASSIFIED
ORNL-18-PWS 18405



Location Sketch Map
ORNL Area Surface Drainage

Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R1

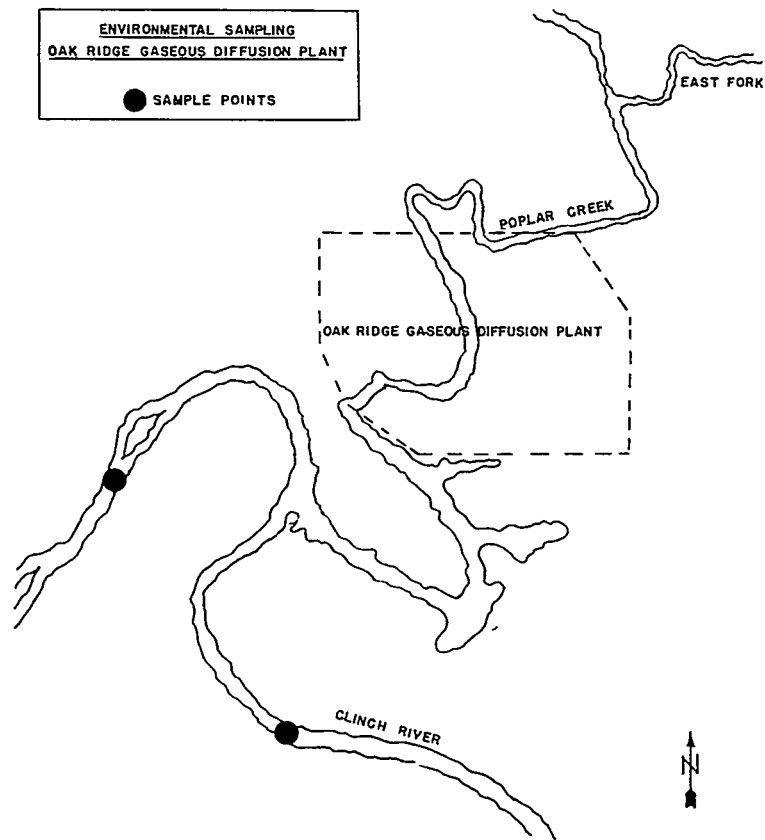


Figure 5

*(Changes in % made per
phone call from W. S. Cottrell - ORNL - 9/27/61.)*

0.12% 0.10%

of the plants were ~~12%~~ and ~~10%~~ respectively of the maximum permissible concentration for populations in the neighborhood of a controlled area. The levels measured during this period were not significantly different from those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network for the first two months of this quarter.

The average air-borne alpha activity in the environs of the ORGDP, five miles from the plant, was 6.5% of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of most of the wastes, and at Mile 4.5, near Kingston, Tennessee, were $12.0 \times 10^{-7} \mu\text{c/cc}$ and $4.0 \times 10^{-7} \mu\text{c/cc}$ respectively. These values are 21% and 7% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was $2.8 \times 10^{-11} \mu\text{c/cc}$ which is 0.0005% of the weighted average (MPC)_w value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all Oak Ridge Plants, was only 0.02% of the (MPC)_w for uranium.

External gamma radiation in the Oak Ridge Area averaged 0.014 mr/hr. This level is not significantly different from the average of the levels measured throughout the United States by the U. S. Public Health Service Surveillance Network.

Conclusion

From the data presented, it may be concluded that the Oak Ridge Operations are contributing little to the air or ground contamination in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes, the concentrations in the river are well below the maximum permissible concentration recommended by the NCRP for populations in the neighborhood of an atomic energy installation.

TABLE I
CONTINUOUS AIR MONITORING DATA
Long-Lived Fission Products

Second Quarter, 1961

| Station Number | Location | Number of Samples Taken | Units of 10^{-13} $\mu\text{c/cc}$ | | | % of (MPC) _a * |
|---------------------------|--------------------|-------------------------|--------------------------------------|---------|---------|---------------------------|
| | | | Maximum | Minimum | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-11 | Kerr Hollow Gate | 14 | 1.38 | 0.38 | 0.91 | 0.09 |
| HP-12 | Midway Gate | 14 | 4.23 | 0.59 | 1.63 | 0.16 |
| HP-13 | Gallaher Gate | 14 | 1.64 | 0.39 | 0.99 | 0.10 |
| HP-14 | White Wing Gate | 14 | 1.74 | 0.31 | 0.94 | 0.09 |
| HP-15 | Blair Gate | 13 | 2.73 | 0.82 | 1.38 | 0.14 |
| HP-16 | Turnpike Gate | 14 | 8.51 | 0.43 | 1.50 | 0.15 |
| HP-17 | Hickory Creek Bend | 14 | 1.57 | 0.18 | 0.96 | 0.10 |
| Average | | | | | 1.19 | 0.12 |
| <u>Remote Stations</u> | | | | | | |
| HP-19 | Norris Dam | 14 | 1.89 | 0.40 | 1.00 | 0.10 |
| HP-20 | Loudoun Dam | 13 | 1.85 | 0.50 | 0.99 | 0.10 |
| HP-21 | Douglas Dam | 13 | 1.62 | 0.22 | 1.04 | 0.10 |
| HP-22 | Cherokee Dam | 14 | 1.53 | 0.20 | 0.86 | 0.09 |
| HP-23 | Watts Bar Dam | 13 | 2.22 | 0.57 | 0.97 | 0.10 |
| HP-24 | Great Falls Dam | 13 | 1.52 | 0.36 | 0.96 | 0.10 |
| HP-25 | Dale Hollow Dam | 13 | 1.66 | 0.23 | 0.97 | 0.10 |
| HP-26 | Berea, Kentucky | 13 | 1.40 | 0.43 | 0.86 | 0.09 |
| Average | | | | | 0.95 | 0.10 |

* $(\text{MPC})_a$ is taken to be 10^{-10} $\mu\text{c/cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA
URANIUM

Second Quarter, 1961

| Distance from Center of Plant | Type of Analyses | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | | | % (MPC)a |
|----------------------------------|--------------------------|-------------------|--------------------------------------|------|-------|------|---------|--------|------|----------|
| | | | Direction from Plant | | | | Average | (MPC)a | | |
| | | | North | East | South | West | | | | |
| 5-Mile Radius* | Uranium Concentration | 16 | 0.5 | 0.75 | 1.8 | 1.4 | 1.3 | 20 | 6.50 | |

* Normal Sampling Frequency: Random sampling; 10 minute samples.

TABLE III

CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8Second Quarter, 1961

| Number of Samples Taken | Units of 10^{-7} $\mu\text{c/cc}$ | | | % of $(\text{MPC})_w$ |
|----------------------------|-------------------------------------|---------|---------|-----------------------|
| | Maximum | Minimum | Average | |
| 91 | 38 | 1 | 12 | 21 |

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

Second Quarter, 1961

| Location | Units of 10^{-8} $\mu\text{c/cc}$ | | | | | | % of (MPC) _w |
|-----------------------|-------------------------------------|-------------------|-------------------|-----------------------|------------------|--------------------------------|---------------------------------|
| | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | Average Gross Beta Activity | (MPC) _w ^a |
| Mi. 33.2 | 0.05 | 0.04 | 0.04 | * | 0.01 | 0.44 | 76 |
| Mi. 20.8 ^b | 0.60 | 0.08 | 0.54 | 67 | 1.2 | 120 | 570 |
| Mi. 4.5 | 0.37 | 0.05 | 0.09 | 35 | 0.50 | 40 | 556 |
| | | | | | | | 0.6 |
| | | | | | | | 21 |
| | | | | | | | 7 |

^a Weighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on levels of waste released and the dilution afforded by the river.

* None detected

TABLE V
URANIUM CONCENTRATION IN THE CLINCH RIVER
Second Quarter, 1961

| Sampling Point | Type of Analyses Made | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | | % (MPC) _w |
|-----------------------|-----------------------|----------------|-------------------------------------|---------|---------|--------------------|----------------------|
| | | | Maximum | Minimum | Average | (MPC) _w | |
| Upstream from ORGDP | Uranium Concentration | 13 | 0.70 | 0 | 0.23 | 2000 | 0.01 |
| Downstream from ORGDP | Uranium Concentration | 11 | 0.63 | 0 | 0.32 | 2000 | 0.02 |

Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS

mr/hr

Second Quarter, 1961

| Station Number | Location | April | May | June | Average |
|----------------|-------------------------|-------|-------|-------|---------|
| 1 | Solway Gate | 0.013 | 0.015 | 0.014 | 0.014 |
| 2 | Y-12 East Portal | 0.012 | 0.014 | 0.015 | 0.014 |
| 3 | Newcomb Road, Oak Ridge | 0.012 | 0.013 | 0.016 | 0.014 |
| 4 | Gallaher Gate | 0.013 | 0.012 | 0.016 | 0.014 |
| 5 | White Wing Gate | 0.012 | 0.013 | 0.014 | 0.013 |
| Average | | | | | 0.014 |

b.c. J. B. Scott



INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name) Mr. J. C. Hart
Company
Location ORNL

Date July 18, 1961

Originating Dept.

Answering letter date

Copy to Mr. K. W. Bahler
Mr. J. P. Murray
Mr. W. C. Richardson
Safety and Health Physics Files RC

Subject News Release on
Environmental Surveys

Attached are data for the quarterly news release as requested by the AEC-CRO, covering environmental surveys made at off-plant locations during the second quarter of 1961.

APH:la

Attachment

A handwritten signature in cursive script, appearing to read "A. P. Huber", written over a horizontal line.
A. P. Huber

For Immediate Release

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
APRIL THROUGH JUNE, 1961

Sampling by the Oak Ridge Gaseous Diffusion Plant during the second quarter of 1961 shows that the amounts of uranium in air and water in the countryside immediately adjacent to the plant and out as far as five miles are not significantly different from the normal background values anticipated for this region.

The average air-borne alpha activity in the plant environs at locations five miles from the plant was not significantly changed from the previous quarter and continued to be only a small fraction of the maximum permissible concentration for nonoccupational exposures. Environmental air sampling data are shown in Table 1 and the sampling points in Figure 1.

Continuous samples obtained from the waterways adjacent to the plant revealed no instances where the uranium concentrations exceeded the maximum permissible concentration.* In fact, the average value obtained at the downstream sample point, which reflects the effects of all the Oak Ridge plants, was only 0.02% of the maximum permissible concentration for the discharge of natural uranium. Sampling data are shown in Table 2, and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements obtained at eight locations surrounding the ORGDP Area averaged 0.020 mr/hr. This is the same as the average background levels obtained throughout the United States by the U. S. Public Health Service Radiation Surveillance Network, employing similar methods and detection instruments.

* National Bureau of Standards Handbook No. 69, Populations adjacent to AEC installations based on a 168-hour continuous exposure to natural uranium.

Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant
July 18, 1961

July 18, 1961

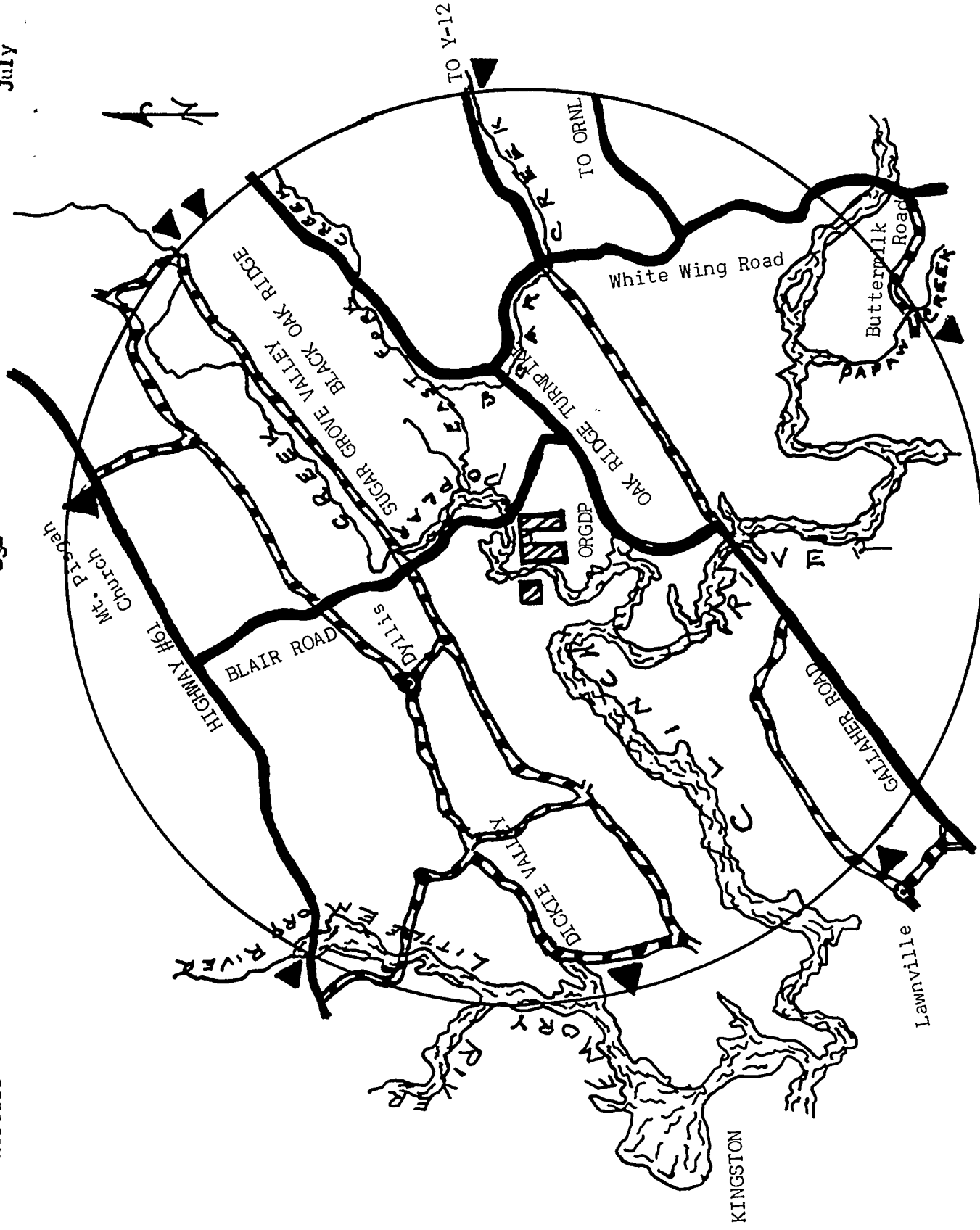
Table 1

ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: April - June, 1961

| <u>Distance from Center of Plant</u> | <u>Type of Analysis Made</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c/cc} \times 10^{-13}$)</u> | | | | | <u>% (MPC) ^a</u> | |
|--|----------------------------------|---------------------------|--|-------------|--------------|-------------|--|---------------------------------|------------|
| | | | <u>Direction from Plant</u> | | | | <u>Max. Permissible Concentration (MPC) ^a</u> | | |
| | | | <u>North</u> | <u>East</u> | <u>South</u> | <u>West</u> | | | <u>Av.</u> |
| 5-Mile Radius | Uranium Con- centration | 16 | 0.5 | 0.75 | 1.8 | 1.4 | 1.3 | 20 | 6.50 |

Normal Sampling Frequency: Random sampling; 10-minute samples.



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP
Air
▲ Sampling Location - 5 Miles from Plant

FIGURE 1

Table 2

ENVIRONMENTAL SAMPLING - LOCAL STREAM
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: April - June, 1961

| <u>Location of Point</u> | <u>Type of Analysis</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c}/\text{cc} \times 10^{-8}$)</u> | | | <u>% (MPC)_w</u> |
|--------------------------|-------------------------|-----------------------|--|------------------------|--|----------------------------|
| | | | <u>Plant Experience</u> | | <u>Maximum Permissible (MPC)_w</u> | |
| | | | <u>Low</u> | <u>High</u> <u>Av.</u> | | |
| <u>Clinch River</u> | | | | | | |
| Upstream | Uranium Concentration | 13 | 0 | 0.70 | 0.23 | 0.01 |
| Downstream | Uranium Concentration | 11 | 0 | 0.63 | 0.32 | 0.02 |

Normal Sampling Frequency: Continuous, composited over one week.

July 13, 1961

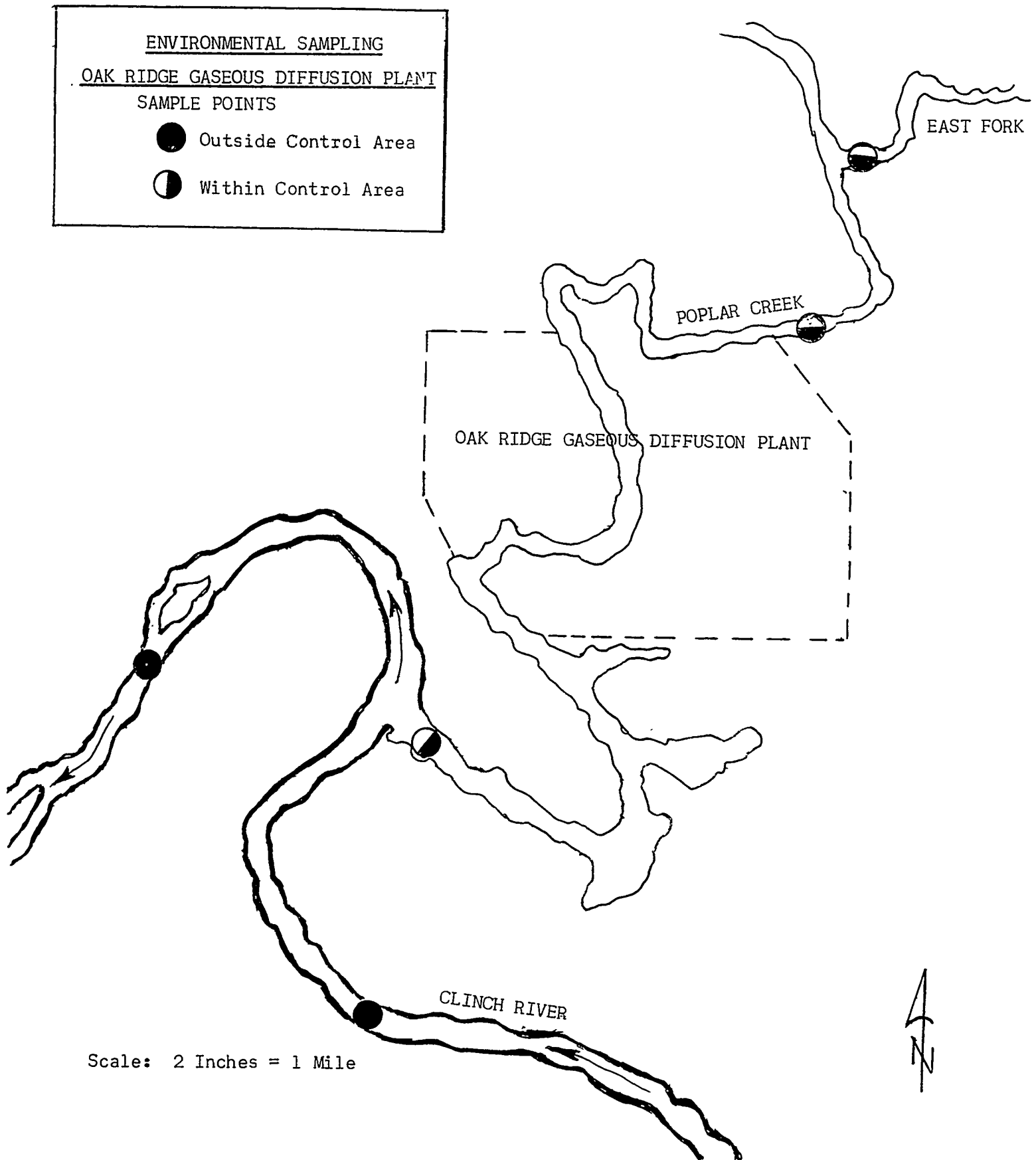


FIGURE 2

UNION CARBIDE NUCLEAR COMPANY • DIVISION OF



CORPORATION

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

June 19, 1961

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie

Gentlemen:

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON
ENVIRONMENTAL LEVELS OF RADIOACTIVITY

As requested, we are enclosing eighty copies of the report for the first quarter, 1961, on Environmental Levels of Radioactivity for the Oak Ridge Area.

Yours very truly,

UNION CARBIDE NUCLEAR COMPANY

Clark E. Center
Vice President

CEC:EDG:dw
Enclosures

cc w/encls.: E. D. Gupton (10)
F. R. Bruce
F. L. Culler
J. P. Murray (4)
H. F. Henry (2)
W. H. Jordan
K. Z. Morgan
J. A. Swartout (2)



June 19 12 PM 2:56

Safety and Health
Physics

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

Report for First Quarter 1961

Applied Health Physics Section
Health Physics Division

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to pits located in the Conasauga shale formation. Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

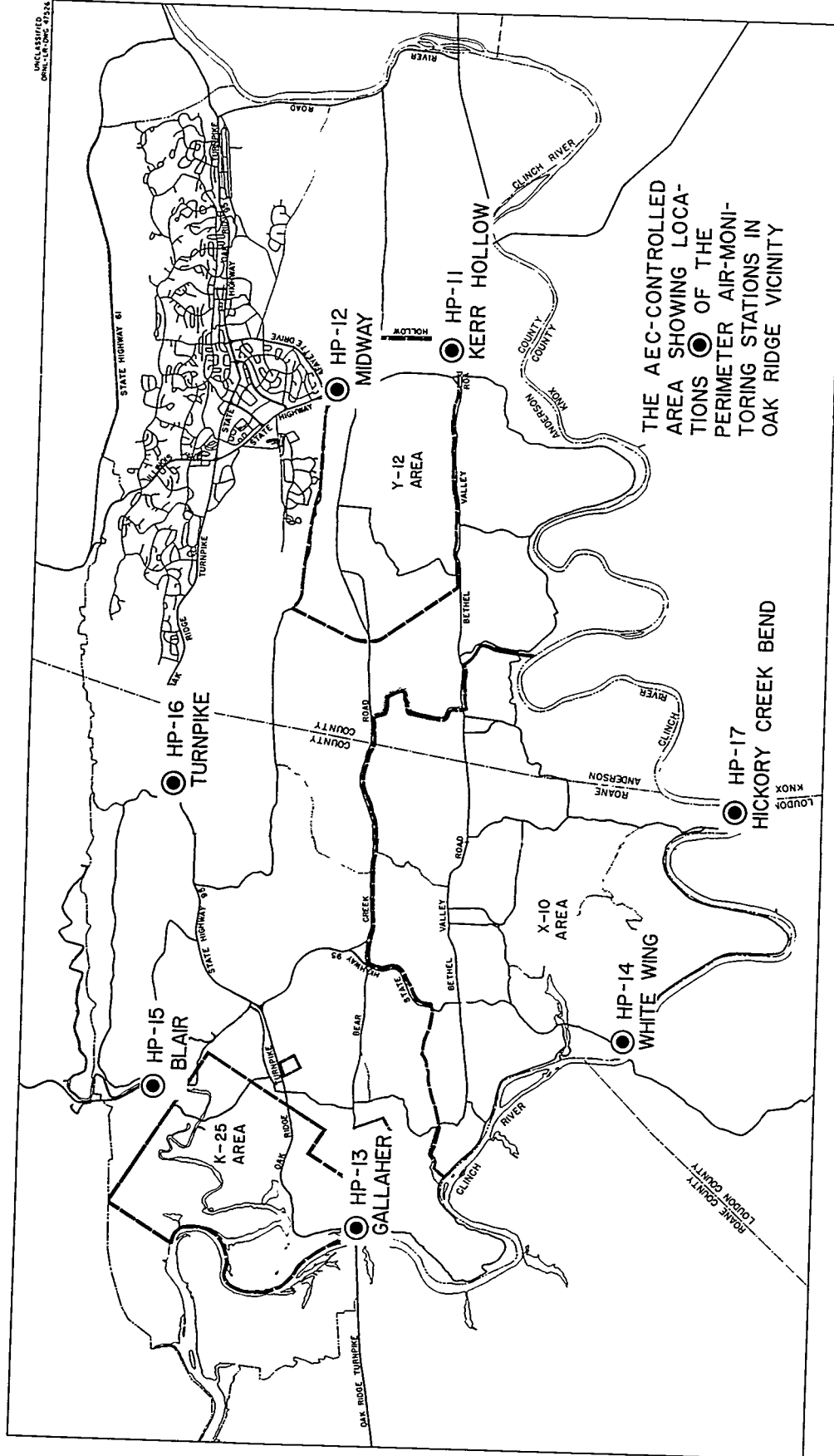
Air Monitoring

Atmospheric contamination by long-lived fission products and fall-out occurring in the general environment of East Tennessee are monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of eight stations encircling the Oak Ridge Area at distances of from 12 to 120 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c/cc}$ of air sampled.

Atmospheric contamination by uranium is determined by taking periodic air samples at eight locations on a two-mile radius and at eight locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

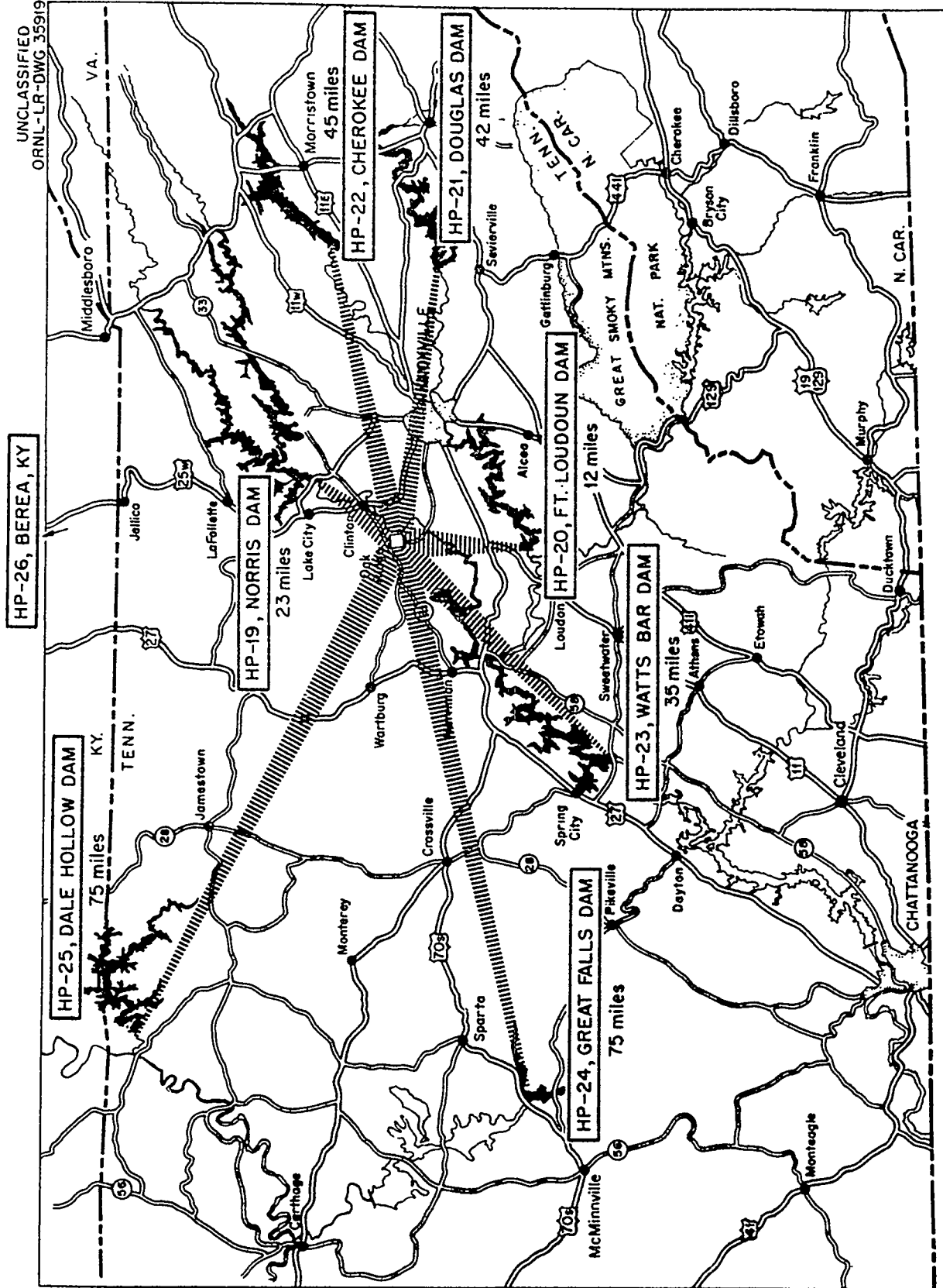
Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes



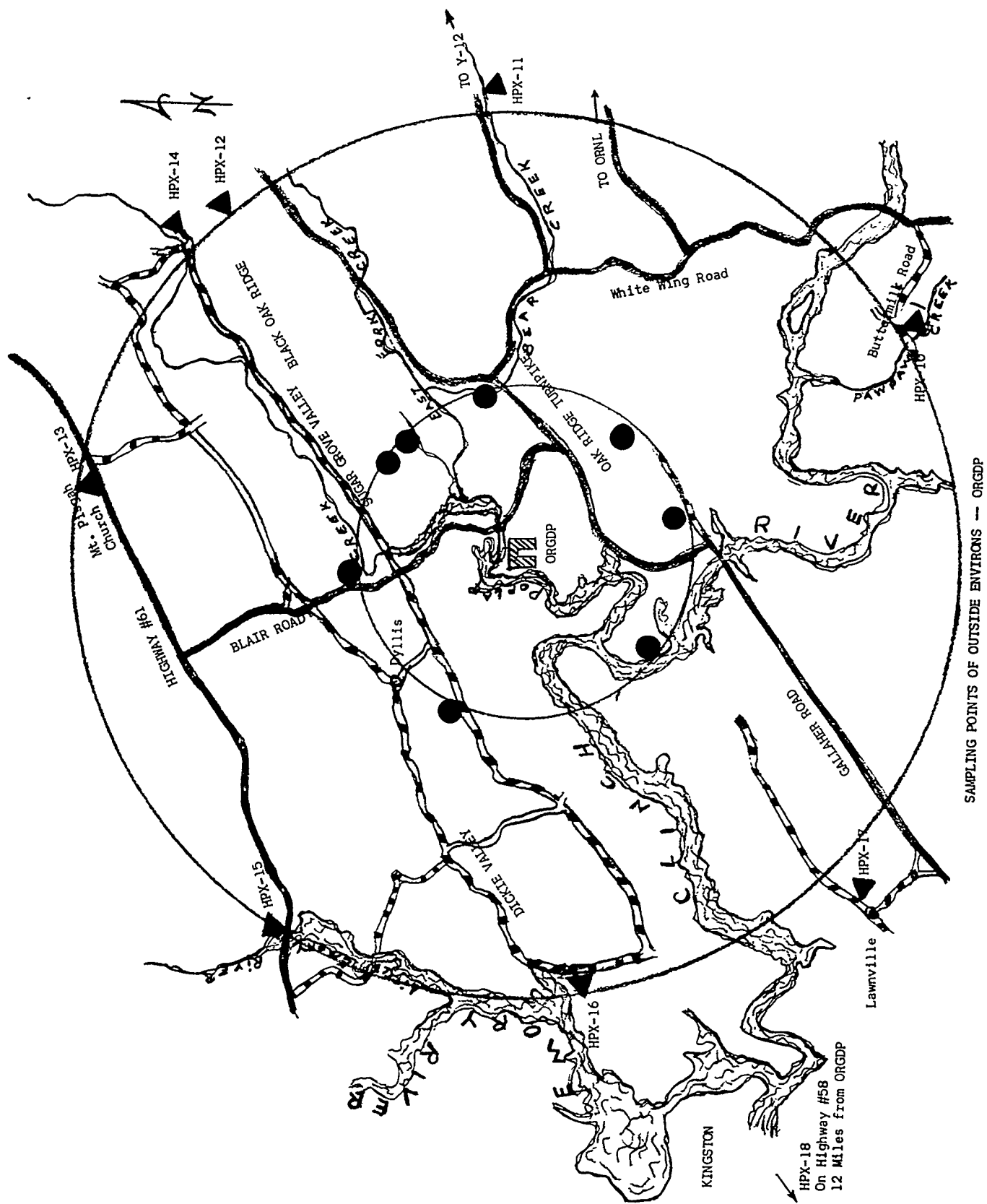
STATION SITES FOR PERIMETER AIR MONITORING SYSTEM

Figure 1



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP
Air

- ▲ Sampling Location - 5 Miles from Plant
- Sampling Location - 2 Miles from Plant

Figure 3

originating at the Oak Ridge Gaseous Diffusion Plant and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

The fraction of the total beta activity comprised by each isotope is determined from analysis of long-lived radionuclides contained in the effluent and a weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

Gamma Measurements

External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Muller tube at a distance of three feet aboveground, and the results are tabulated in terms of mr/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the first quarter of 1961 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

The average air contamination level for gross β activity as shown by the continuous air monitoring filter data for both the immediate and remote environs

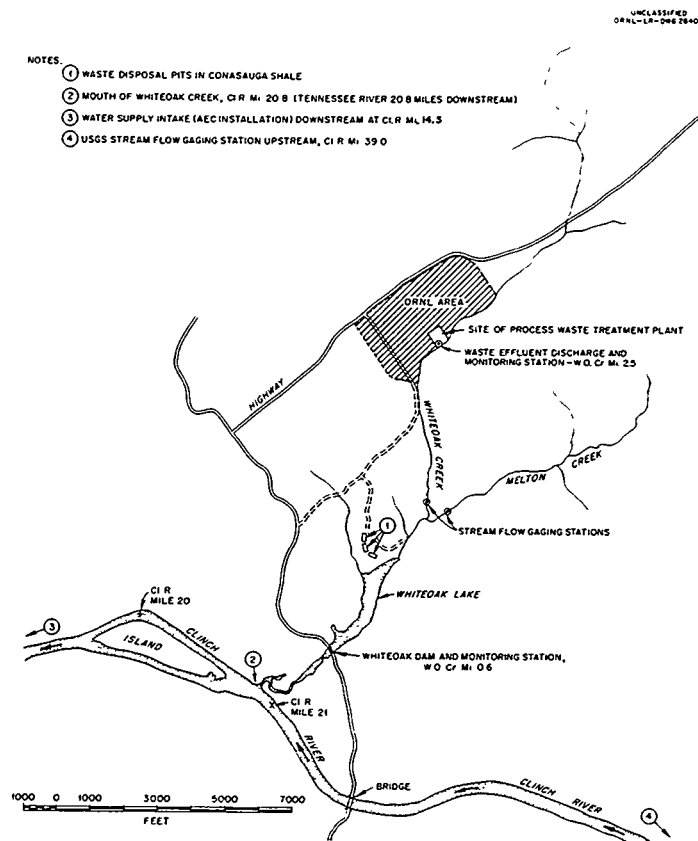


Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R1

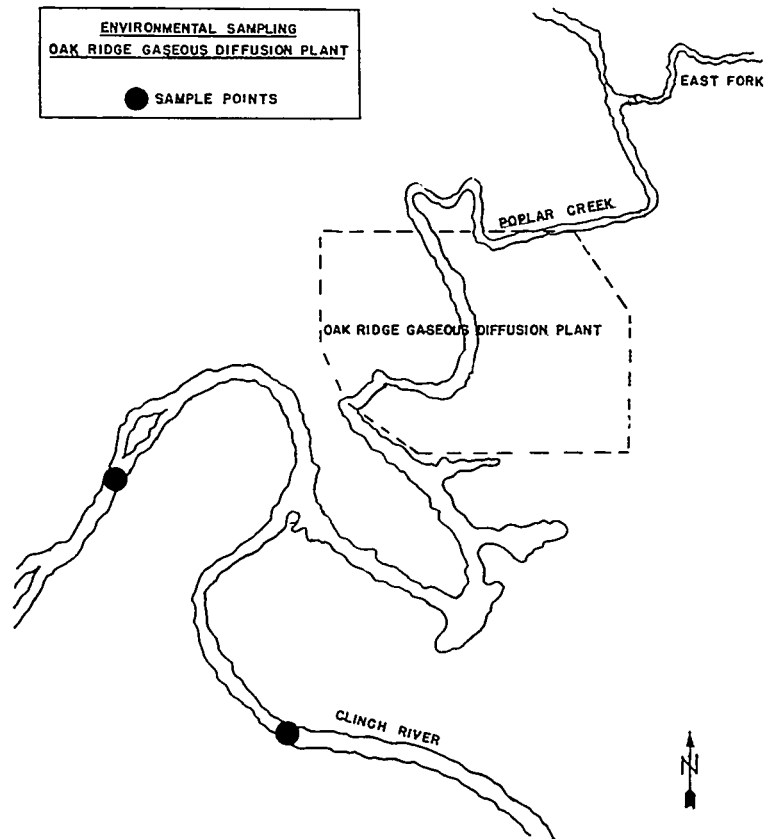


Figure 5

of the plants was 0.06% of the maximum permissible concentration for populations in the neighborhood of a controlled area. The levels measured during this period were not significantly different from those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network.

The average air-borne alpha activity in the environs of the ORGDP at locations two and five miles from the plant was 2% and 5% respectively of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The calculated average concentration of radioactivity in the Clinch River at Mile 20.8, the point of entry of most waste materials, and at Mile 4.5, near Kingston, Tennessee, were 12.0×10^{-7} $\mu\text{c/cc}$ and 6.7×10^{-7} $\mu\text{c/cc}$ respectively. These values are 33% and 13% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The rise in concentration of radioactivity in the Clinch River at Mile 20.8 reflects a decrease in the dilution afforded by the river during this quarter. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 2.5×10^{-11} $\mu\text{c/cc}$ which is 0.0007% of the weighted average $(\text{MPC})_w$ value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all of the Oak Ridge Plants, was only 0.01% of the $(\text{MPC})_w$ for uranium.

External gamma radiation in the Oak Ridge Area averaged 0.015 mr/hr. This level is not significantly different from the average of the levels measured throughout the United States by the U. S. Public Health Service Radiation Surveillance Network.

Conclusion

From the data presented, it may be concluded that the Oak Ridge Operations are contributing little to the air or ground contamination in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes, the concentrations in the river are well below the maximum permissible concentration recommended by the NCRP for populations in the neighborhood of an atomic energy installation.

TABLE I
CONTINUOUS AIR MONITORING DATA
Long-Lived Fission Products

First Quarter 1961

| Station Number | Location | Number of Samples Taken | Units of 10^{-13} $\mu\text{c/cc}$ | | | % of (MPC) _a * |
|---------------------------|--------------------|-------------------------|--------------------------------------|---------|---------|---------------------------|
| | | | Maximum | Minimum | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-11 | Kerr Hollow Gate | 13 | 0.98 | 0.08 | 0.57 | 0.06 |
| HP-12 | Midway Gate | 13 | 1.65 | 0.20 | 0.88 | 0.09 |
| HP-13 | Gallaher Gate | 14 | 0.88 | 0.11 | 0.52 | 0.05 |
| HP-14 | White Wing Gate | 14 | 1.10 | 0.00 | 0.51 | 0.05 |
| HP-15 | Blair Gate | 13 | 1.13 | 0.00 | 0.65 | 0.07 |
| HP-16 | Turnpike Gate | 13 | 1.08 | 0.00 | 0.54 | 0.05 |
| HP-17 | Hickory Creek Bend | 13 | 1.11 | 0.00 | 0.54 | 0.05 |
| Average | | | | | 0.60 | 0.06 |
| <u>Remote Stations</u> | | | | | | |
| HP-19 | Norris Dam | 13 | 1.04 | 0.14 | 0.64 | 0.06 |
| HP-20 | Loudoun Dam | 13 | 1.03 | 0.00 | 0.54 | 0.05 |
| HP-21 | Douglas Dam | 13 | 1.18 | 0.04 | 0.62 | 0.06 |
| HP-22 | Cherokee Dam | 14 | 1.07 | 0.00 | 0.50 | 0.05 |
| HP-23 | Watts Bar Dam | 13 | 1.10 | 0.00 | 0.52 | 0.05 |
| HP-24 | Great Fall Dam | 13 | .91 | 0.03 | 0.50 | 0.05 |
| HP-25 | Dale Hollow Dam | 13 | .98 | 0.14 | 0.55 | 0.06 |
| HP-26 | Berea, Kentucky | 13 | .90 | 0.00 | 0.53 | 0.05 |
| Average | | | | | 0.55 | 0.06 |

* $(\text{MPC})_a$ is taken to be 10^{-10} $\mu\text{c/cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA
URANIUM

First Quarter, 1961

| Distance from Center of Plant | Type of Analyses | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | | |
|----------------------------------|--------------------------|-------------------|--------------------------------------|------|-------|---------|--------|
| | | | Direction from Plant | | | Average | (MPC)a |
| | | | North | East | South | West | |
| 2-Mile Radius* | Uranium Concentration | 16 | 0.25 | 0.25 | 0.67 | 0.0 | 0.41 |
| 5-Mile Radius* | " | 16 | 0.0 | 1.33 | 1.25 | 0.75 | 1.03 |
| | | | | | | | 20 |
| | | | | | | | 20 |
| | | | | | | | 2 |
| | | | | | | | 5 |

* Normal Sampling Frequency: Random sampling; 10 minute samples.

TABLE III

CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

First Quarter 1961

| Number of Samples Taken | Units of $10^{-7} \mu\text{c/cc}$ | | | % of $(\text{MPC})_w$ |
|----------------------------|-----------------------------------|---------|---------|-----------------------|
| | Maximum | Minimum | Average | |
| 91 | 32 | 2 | 12 | 33 |

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

First Quarter 1961

| Location | Units of 10^{-8} $\mu\text{c/cc}$ | | | | | | (MPC) _w ^a | % of MPC |
|-----------------------|-------------------------------------|-------------------|-------------------|-----------------------|------------------|-----------------------------|---------------------------------|----------|
| | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | Average Gross Beta Activity | | |
| Mi. 37.5 | 0.05 | 0.01 | * | * | * | 0.39 | 80 | 0.5 |
| Mi. 20.8 ^b | 1.3 | 0.23 | 0.51 | 73 | 1.5 | 120 | 364 | 33 |
| Mi. 4.5 | 0.78 | 0.06 | ** | 48 | 0.72 | 67 | 530 | 13 |

^a Weighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on levels of waste released and the dilution afforded by the river.

* None detected

** Trace

TABLE V
URANIUM CONCENTRATION IN THE CLINCH RIVER
First Quarter, 1961

| Sampling Point | Type of Analyses Made | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | % (MPC) _w |
|-----------------------|-----------------------|----------------|-------------------------------------|---------|---------|----------------------|
| | | | Maximum | Minimum | Average | |
| Upstream from ORGDP | Uranium Concentration | 14 | 0.42 | 0.0 | 0.11 | <0.01 |
| Downstream from ORGDP | " | 13 | 0.49 | 0.07 | 0.17 | <0.01 |

Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS

mr/hr

First Quarter, 1961

| Station Number | Location | January | February | March | Average |
|----------------|-------------------------|---------|----------|-------|---------|
| 1 | Solway Gate | .019 | .015 | .014 | .016 |
| 2 | Y-12 East Portal | .013 | .013 | .014 | .013 |
| 3 | Newcomb Road, Oak Ridge | .013 | .013 | .014 | .013 |
| 4 | Gallaher Gate | .015 | .016 | .019 | .017 |
| 5 | White Wing Gate | .016 | .013 | .014 | .014 |
| Average | | | | | .015 |



INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name) Mr. J. C. Hart
Company
Location ORNL

Date April 17, 1961

Originating Dept.

Answering letter date

Copy to Mr. K. W. Bahler
Mr. J. P. Murray
Mr. W. L. Richardson
Safety and Health Physics RC ✓

Subject News Release on
Environmental Surveys

Attached are data for the news release on environmental surveys for the first quarter of 1961 for inclusion in the over-all report to the Commission. The tables include the data specified in the letter of February 16 from Mr. S. R. Sapirie to Mr. C. E. Center.

Please add ORGDP Safety and Health Physics to the report distribution list when it is transmitted to ORO and delete Dr. H. F. Henry.

APH:la

Attachments


A. P. Huber

1961 APR 21 PM 2:28

Safety and Health
Physics

For Immediate Release

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JANUARY THROUGH MARCH, 1961

Sampling by the Oak Ridge Gaseous Diffusion Plant during the first quarter of 1961 shows that the amounts of uranium in air and water in the countryside adjacent to the plant and at distances out to five miles are not significantly different than the normal amounts anticipated for this region of the country.

The average air-borne alpha activity in the plant environs at locations two and five miles from the plant was only a small fraction of the maximum permissible concentration for the general population. Environmental air sampling data are shown in Table 1 and the sampling points in Figure 1.

Continuous samples obtained from the waterways adjacent to the plant demonstrate that there were no instances where the uranium concentrations exceeded the permissible limits. These limits are those prescribed by the National Bureau of Standards in Handbook No. 69 for natural uranium in the potable water supply of the general population and are based on 168-hour continuous weekly exposures. The average downstream level which reflects the effects of all of the Oak Ridge plants was less than 0.01% of the maximum permissible concentration for the discharge of natural uranium. Sampling data are shown in Table 2 and the sampling points in Figure 2.

External gamma radiation levels as determined from measurements obtained at 17 locations surrounding the ORGDP Area averaged 0.020 mr/hr. This is the same as the average background levels measured throughout the United States using similar methods and detection instruments by the U. S. Public Health Service Radiation Surveillance Network.

Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant
April 17, 1961

April 17, 1961

Table 1

ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: January-March, 1961

| <u>Distance From Center of Plant</u> | <u>Type of Analysis Made</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c/cc} \times 10^{-13}$)</u> | | | | | <u>Max. Permissible Concentration (MPC)a</u> | <u>%(MPC)a</u> |
|--|----------------------------------|---------------------------|--|-------------|--------------|-------------|------------|--|----------------|
| | | | <u>Direction from Plant</u> | | | | <u>Av.</u> | | |
| | | | <u>North</u> | <u>East</u> | <u>South</u> | <u>West</u> | | | |
| 2-Mile Radius | Uranium Concen- tration | 16 | 0.25 | 0.25 | 0.67 | 0.0 | 0.41 | 20 | 2.05 |
| 5-Mile Radius | Uranium Concen- tration | 16 | 0.00 | 1.33 | 1.25 | 0.75 | 1.03 | 20 | 5.15 |

Normal Sampling Frequency: Random sampling; 10-minute samples.

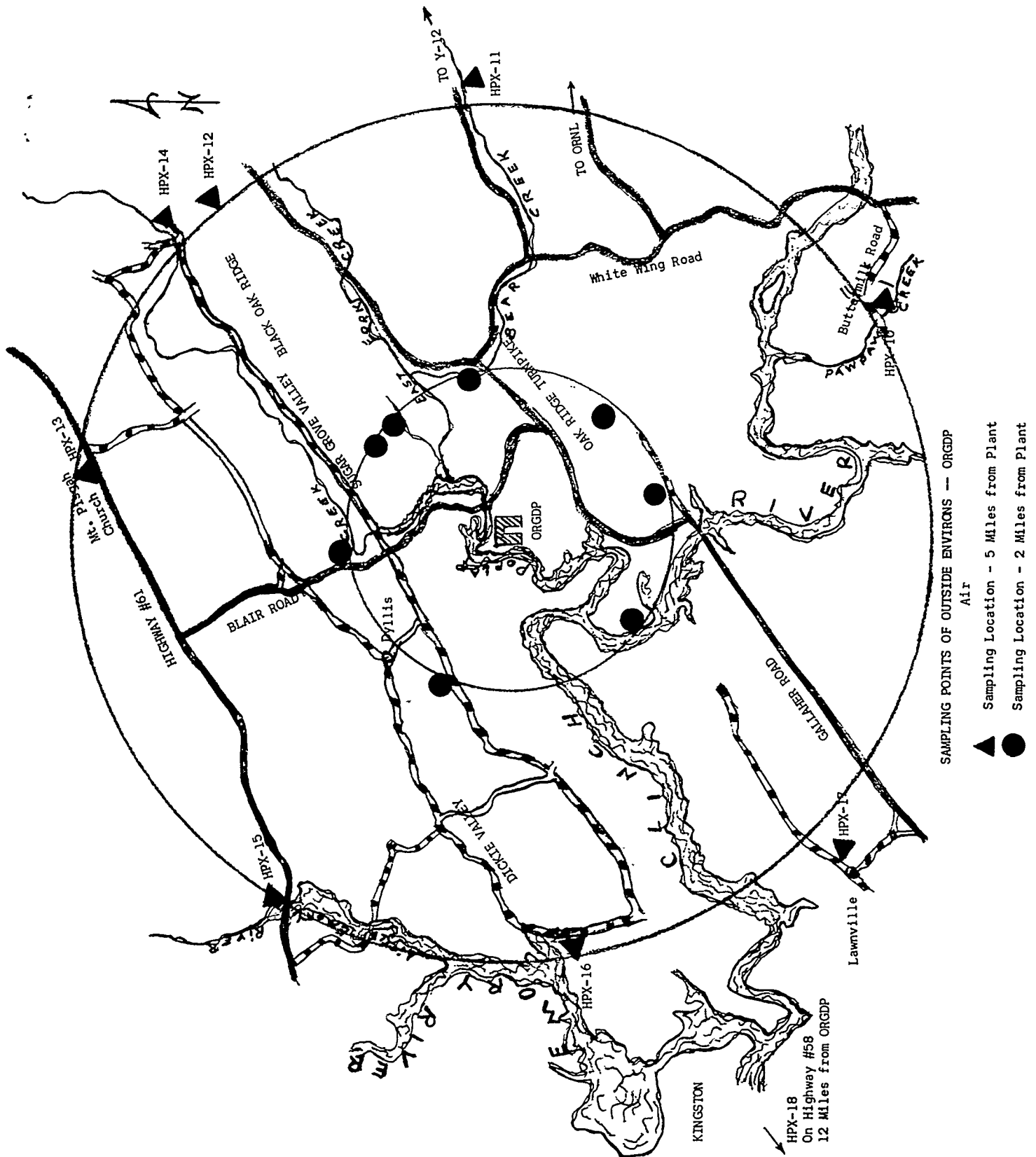


Figure 1

Table 2

ENVIRONMENTAL SAMPLING - LOCAL STREAM
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: January-March, 1961

| <u>Location of Point</u> | <u>Type of Analysis</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c/cc} \times 10^{-8}$)</u> | | | <u>%(MPC)_w</u> |
|--------------------------|-------------------------|-----------------------|---|----------------------------|--------------------------|---------------------------|
| | | | <u>Plant Experience</u> | <u>Maximum Permissible</u> | <u>(MPC)_w</u> | |
| | | | <u>Low</u> | <u>High</u> | <u>Av.</u> | |
| <u>Clinch River</u> | | | | | | |
| Upstream | Uranium Concentration | 14 | 0 | 0.42 | 0.11 | < 0.01 |
| Downstream | Uranium Concentration | 13 | 0.07 | 0.49 | 0.17 | < 0.01 |

Normal Sampling Frequency: Continuous, composited over one week.

April 17, 1961

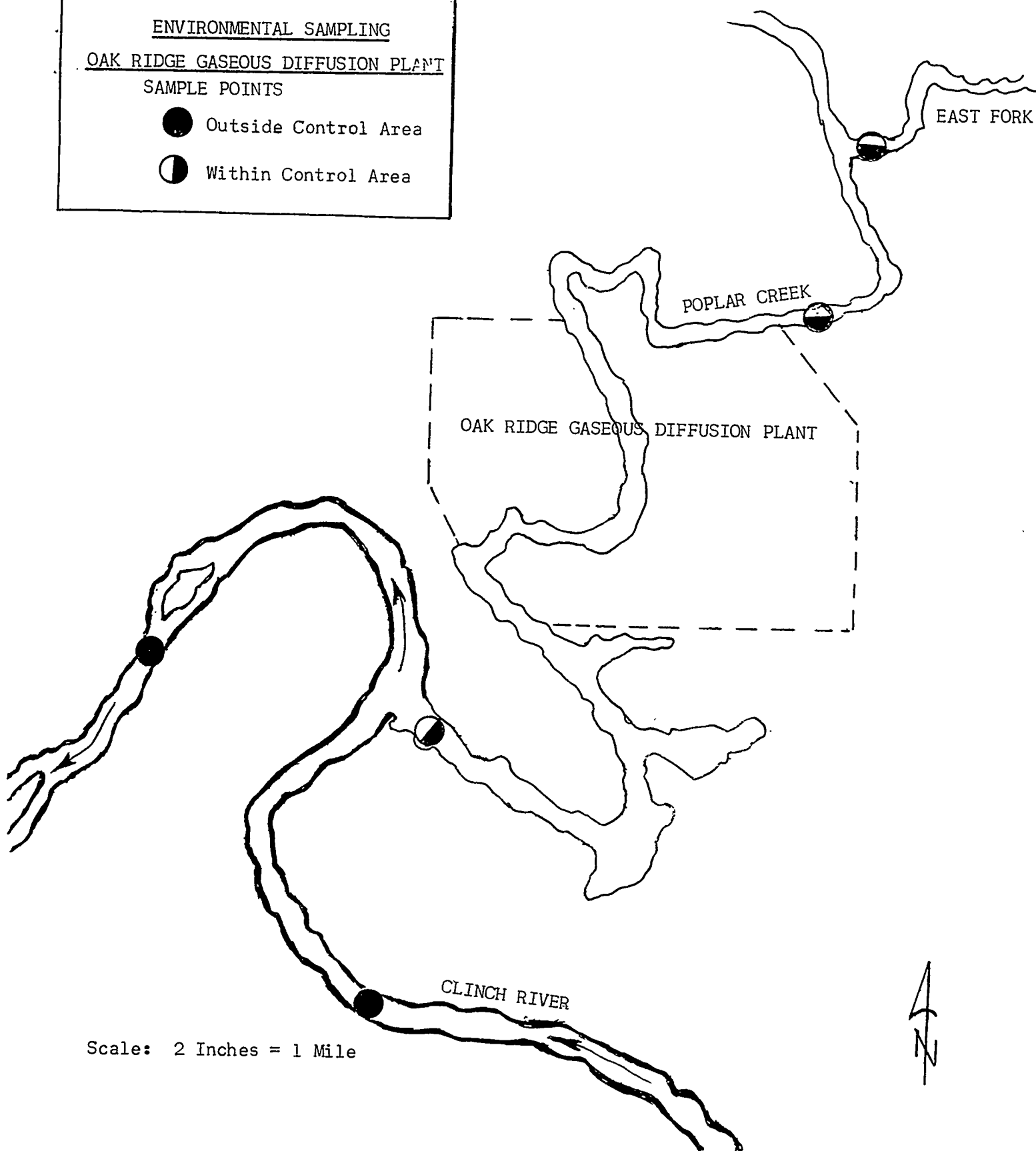
ENVIRONMENTAL SAMPLING

OAK RIDGE GASEOUS DIFFUSION PLANT

SAMPLE POINTS

● Outside Control Area

◐ Within Control Area



Scale: 2 Inches = 1 Mile



POST OFFICE BOX P, OAK RIDGE, TENNESSEE

March 21, 1961

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie

Gentlemen:

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON
ENVIRONMENTAL LEVELS OF RADIOACTIVITY

As requested, we are enclosing eighty copies of the report for the fourth quarter, 1960, on Environmental Levels of Radioactivity for the Oak Ridge Area.

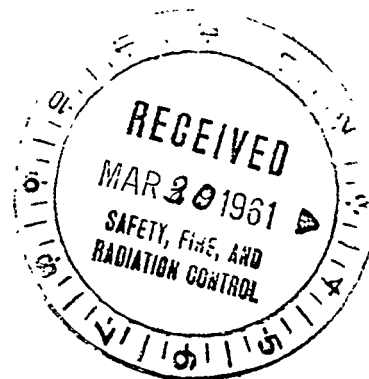
Yours very truly,

UNION CARBIDE NUCLEAR COMPANY

Clark E. Center
Vice President

CEC:HHA:dc
Enclosures

cc w/encls.: H. H. Abee (10)
F. R. Bruce
F. L. Culler
J. P. Murray (4) ~~L. B. Emlet~~ (4)
H. F. Henry (2)
W. H. Jordan
K. Z. Morgan
J. A. Swartout (2)



March 14, 1961

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

Report for Fourth Quarter 1960

Data Compiled by: H. H. Abee

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to pits located in the Conasauga shale formation. Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

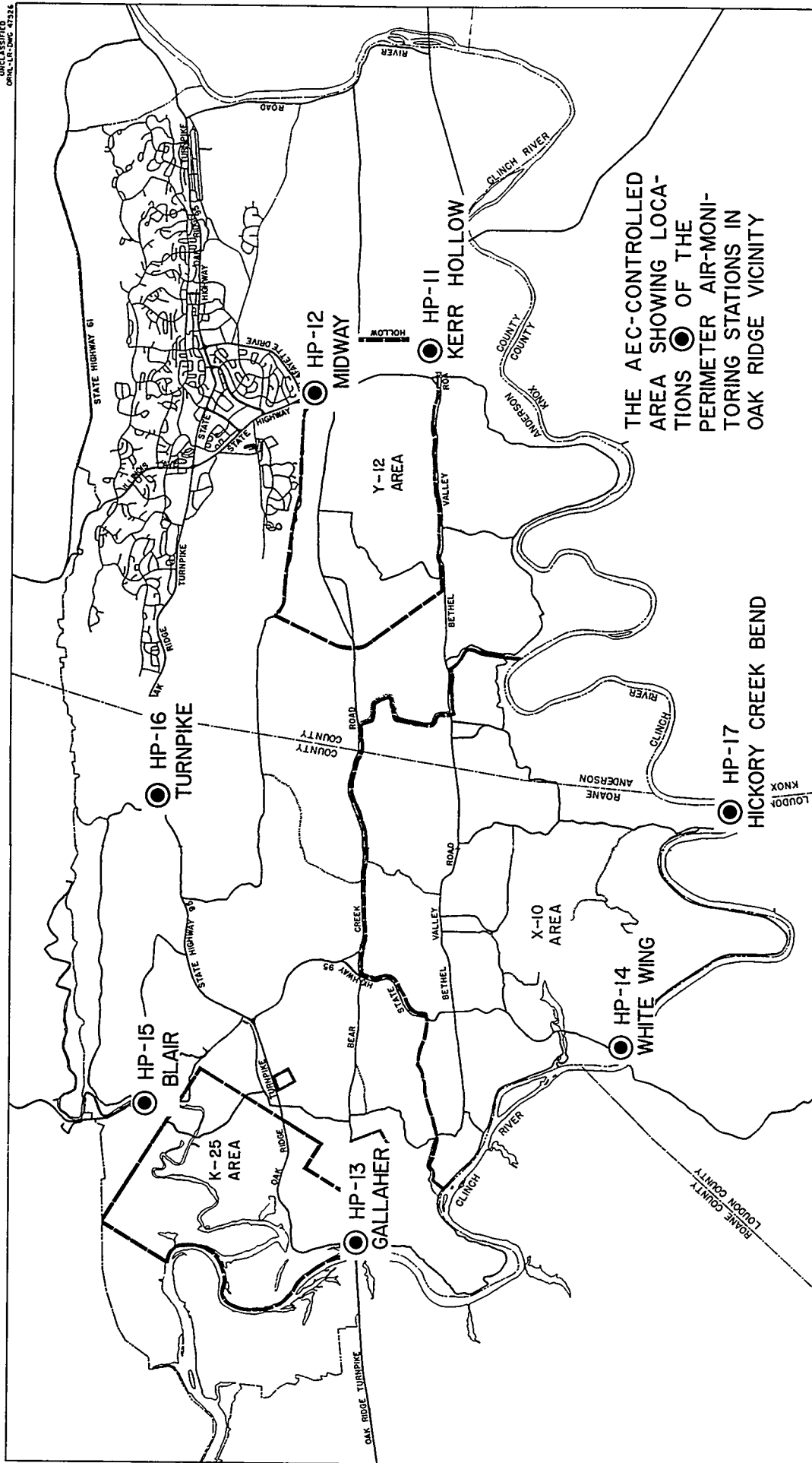
Air Monitoring

Atmospheric contamination by long-lived fission products and fall-out occurring in the general environment of East Tennessee are monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of eight stations encircling the Oak Ridge Area at distances of from 12 to 120 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. The filter paper will collect those particulates considered to be respirable. Data collected are accumulated and tabulated in average $\mu\text{c/cc}$ of air sampled.

Atmospheric contamination by uranium is determined by taking periodic air samples at seven locations on a two-mile radius and at seven locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

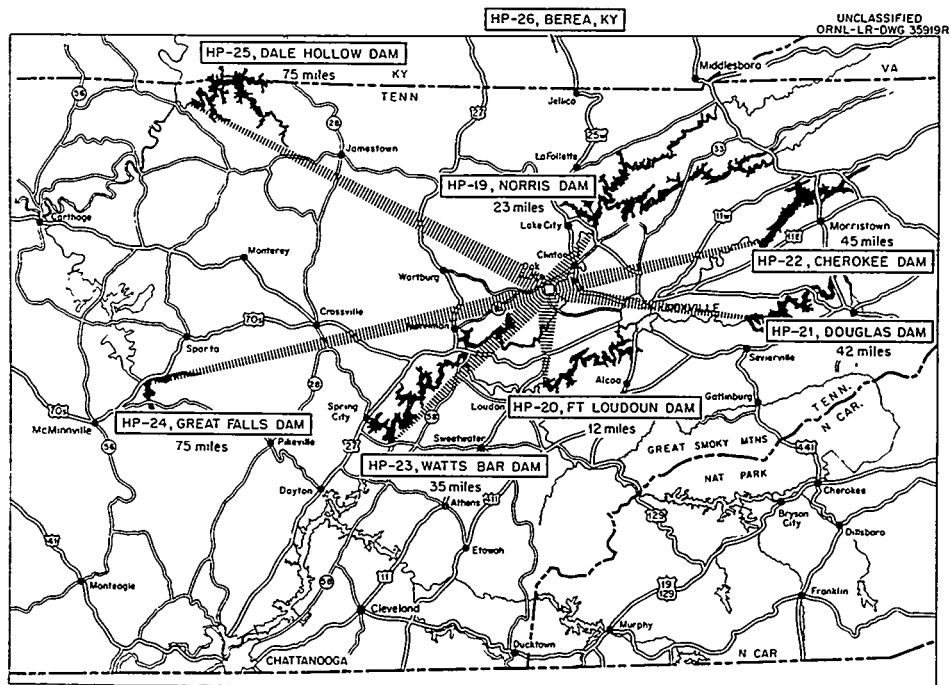
Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are controlled so that resulting average concentrations in the Clinch River comply



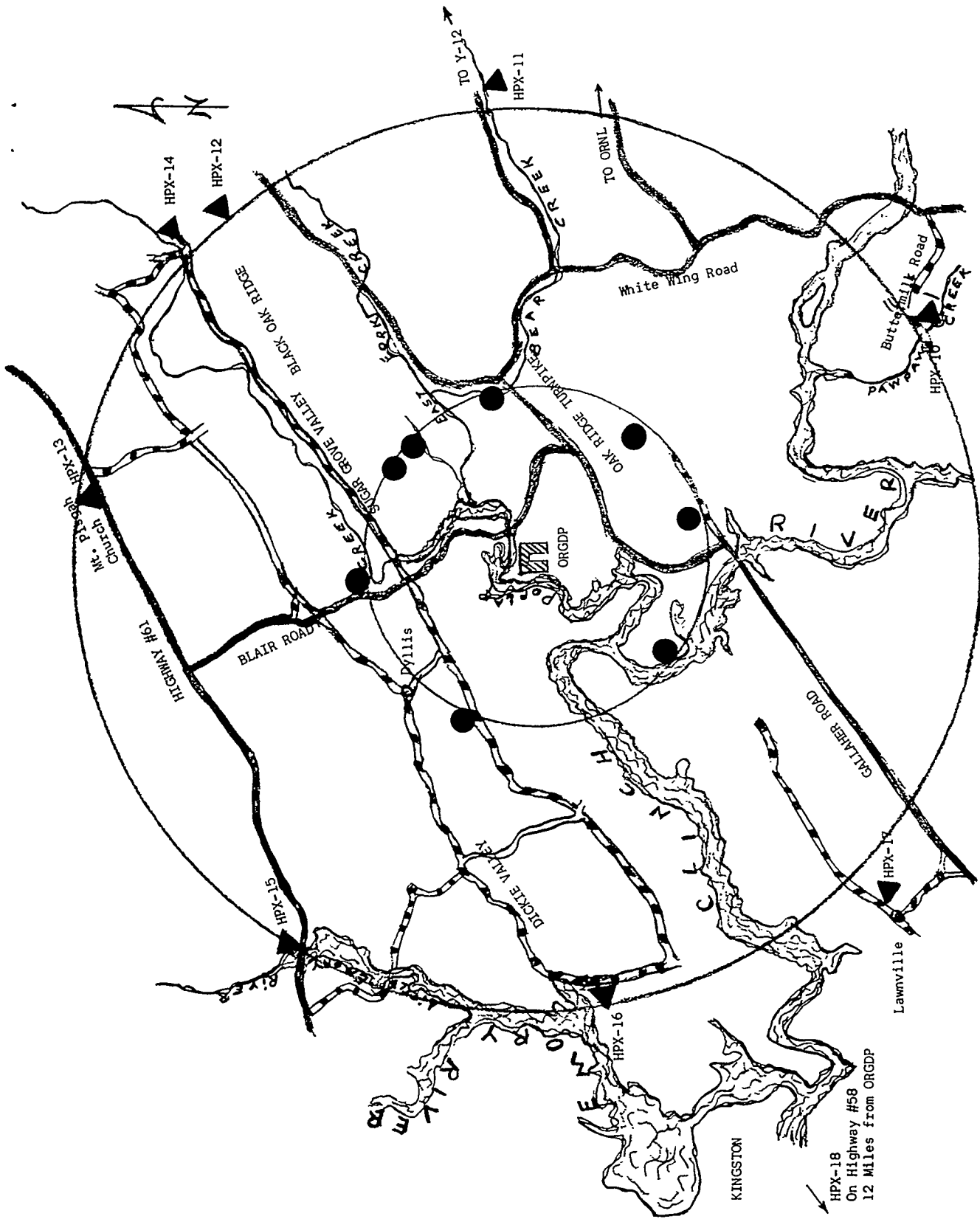
STATION SITES FOR PERIMETER AIR MONITORING SYSTEM

Figure 1



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS --- ORGDP

- ▲ Sampling Location - 5 Miles from Plant
- Sampling Location - 2 Miles from Plant

with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

The fraction of the total beta activity comprised by each isotope is determined from analysis of long-lived radionuclides contained in the effluent and a weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

Gamma Measurements

External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Muller tube at a distance of three feet aboveground and the results are tabulated in terms of mr/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the fourth quarter of 1960 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

The air contamination level for gross β activity as shown by the continuous air monitoring filter data for both the immediate and remote environs of the plants was 0.05% of the maximum permissible concentration for populations in the neighborhood of a controlled area. The levels measured during this period were not significantly different from those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network.

Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R1

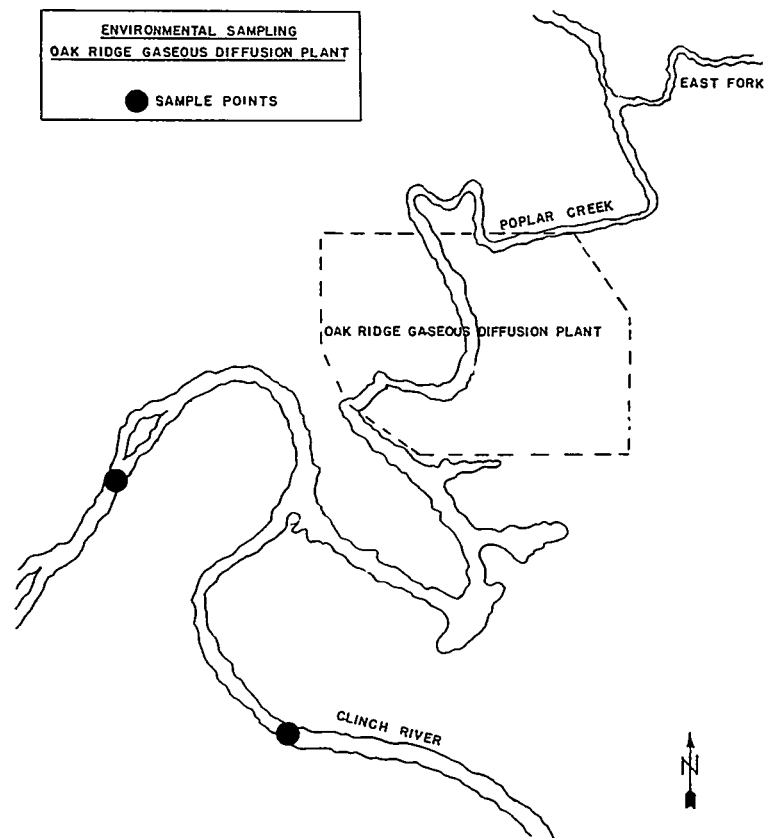


Figure 5

The average air-borne alpha activity in the environs of the ORGDP as determined from the results of ten-minute spot samples at locations two and five miles from the plant was slightly above the normally low level. A single period of increased activity which occurred early in November was coincident with a pilot stage run being made with highly enriched uranium materials and was largely responsible for this increase. Following completion of the short run, background values were again rapidly re-established; modification of the involved process is being studied. Of the 427 eight-hour continuous samples obtained in those plant operations areas where stack or vent discharge of uranium materials is possible, less than 1% were above the maximum permissible concentration for occupational exposure and the average was only a small fraction of this concentration.

The calculated average concentration of radioactivity in the Clinch River at Mile 20.8, the point of entry of most waste materials, and at Mile 4.5, near Kingston, Tennessee, were 7.0×10^{-7} $\mu\text{c/cc}$ and 6.0×10^{-7} $\mu\text{c/cc}$ respectively. These values are 22% and 17% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The rise in concentration of radioactivity in the Clinch River during this quarter reflects an increase in the quantity of radioactive materials discharged. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 1.4×10^{-11} $\mu\text{c/cc}$ which is 0.0004% of the weighted average (MPC)_w value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all of the Oak Ridge Plants, was only 0.01% of the (MPC)_w for uranium.

External gamma radiation in the Oak Ridge Area averaged 0.015 mr/hr. This level is not significantly different from the average of the levels measured throughout the United States by the U. S. Public Health Service Radiation Surveillance Network.

Conclusion

From the data presented, it seems evident that the Oak Ridge Operations are contributing little to the air or ground contamination in the neighborhood of the area controlled by the Atomic Energy Commission.

Some radioactivity has been contributed to the Clinch River by the release of radioactive liquid wastes, but concentrations of radioactivity in the river are well below the maximum permissible concentration recommended by the NCRP for populations living in the vicinity of an atomic energy installation.

TABLE I
CONTINUOUS AIR MONITORING DATA
Long-Lived Fission Products

Fourth Quarter 1960

| Station Number | Location | Number of Samples Taken | Units of 10^{-13} $\mu\text{c/cc}$ | | | % of (MPC)a * |
|---------------------------|--------------------|-------------------------|--------------------------------------|---------|---------|---------------|
| | | | Maximum | Minimum | Average | |
| <u>Perimeter Stations</u> | | | | | | |
| HP-11 | Kerr Hollow Gate | 13 | 0.96 | 0.04 | 0.37 | 0.04 |
| HP-12 | Midway Gate | 13 | 1.80 | 0.20 | 0.50 | 0.05 |
| HP-13 | Gallaher Gate | 13 | 0.72 | 0.24 | 0.50 | 0.05 |
| HP-14 | White Wing Gate | 13 | 0.72 | 0.20 | 0.46 | 0.05 |
| HP-15 | Blair Gate | 13 | 0.89 | 0.24 | 0.52 | 0.05 |
| HP-16 | Turnpike Gate | 13 | 1.09 | 0.12 | 0.46 | 0.05 |
| HP-17 | Hickory Creek Bend | 13 | 1.06 | 0.15 | 0.41 | 0.04 |
| Average | | | | | 0.46 | 0.05 |
| <u>Remote Stations</u> | | | | | | |
| HP-19 | Norris Dam | 13 | 2.66 | 0.39 | 0.80 | 0.08 |
| HP-20 | Loudoun Dam | 13 | 0.81 | 0.25 | 0.49 | 0.05 |
| HP-21 | Douglas Dam | 13 | 0.99 | 0.12 | 0.46 | 0.05 |
| HP-22 | Cherokee Dam | 13 | 0.75 | 0.14 | 0.41 | 0.04 |
| HP-23 | Watts Bar Dam | 13 | 0.78 | 0.27 | 0.52 | 0.05 |
| HP-24 | Great Falls Dam | 13 | 0.62 | 0.31 | 0.49 | 0.05 |
| HP-25 | Dale Hollow Dam | 12 | 0.69 | 0.18 | 0.38 | 0.04 |
| HP-26 | Berea, Kentucky | 12 | 0.63 | 0.12 | 0.34 | 0.03 |
| Average | | | | | 0.49 | 0.05 |

* (MPC)^a is taken to be 10^{-10} $\mu\text{c/cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.

TABLE II
OAK RIDGE GASEOUS DIFFUSION PLANT AIR MONITORING DATA

URANIUM

Fourth Quarter 1960

| Distance from Center of Plant | Type of Analyses | No. of Samples | Units of 10^{-13} $\mu\text{c/cc}$ | | | | | | | | % (MPC)a |
|----------------------------------|--------------------------|-------------------|--------------------------------------|------|-------|-------|------|---------|--------|--|----------|
| | | | Direction from Plant | | | | | Average | (MPC)a | | |
| | | | North | East | | South | West | | | | |
| | | | | East | South | | | | | | |
| 2-Mile Radius* | Uranium Concentration | 42 | 1.16 | 0.81 | 1.69 | 0.0 | 1.11 | 20 | 5.6 | | |
| 2-Mile Radius** | " | 16 | 270 | 312 | 39 | 180 | 188 | | | | |
| 5-Mile Radius* | " | 40 | 7.10 | 2.54 | 1.62 | 2.6 | 3.06 | 20 | 15.3 | | |
| 5-Mile Radius** | " | 16 | 169 | 93 | 49 | 169 | 110 | | | | |

* Reflects normal levels existing over most of quarter.

** Reflects increased levels existing for a single sample period. See discussion on Page 8, paragraph 1.

TABLE III

CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8Fourth Quarter 1960

| Number of Samples Taken | Units of 10^{-7} $\mu\text{c/cc}$ | | | % of (MPC) _w |
|----------------------------|-------------------------------------|---------|---------|-------------------------|
| | Maximum | Minimum | Average | |
| 91 | 59 | 1.7 | 7.0 | 22 |

TABLE IV

AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

Fourth Quarter 1960

| Location | Units of 10^{-8} $\mu\text{c/cc}$ | | | | | | (MPC) _w ^a | % of MPC |
|-----------------------|-------------------------------------|-------------------|-------------------|-----------------------|------------------|-----------------------------|---------------------------------|----------|
| | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | Average Gross Beta Activity | | |
| Mi. 37.5 | .05 | .04 | * | * | * | 0.14 | 27 | 0.5 |
| Mi. 20.8 ^b | 0.71 | 0.16 | 0.39 | 28 | 0.86 | 70 | 320 | 22 |
| Mi. 4.5 | 1.3 | 0.11 | 0.14 | 40 | 0.81 | 60 | 345 | 17 |

^a Weighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on levels of waste released and the dilution afforded by the river.

* None detected.

TABLE V

URANIUM CONCENTRATION IN THE CLINCH RIVER

Fourth Quarter 1960

| Sampling Point | Type of Analyses Made | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | | % (MFC) _w |
|-----------------------|-----------------------|----------------|-------------------------------------|---------|---------|--------------------|----------------------|
| | | | Maximum | Minimum | Average | (MFC) _w | |
| Upstream from ORGDP | Uranium Concentration | 7 | 0.28 | < 0.07 | 0.14 | 2000 | < 0.01 |
| Downstream from ORGDP | " | 7 | 1.5 | 0.07 | 0.27 | 2000 | 0.01 |

Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI

EXTERNAL GAMMA RADIATION LEVELS

mr/hr

Fourth Quarter 1960

| Station Number | Location | October | November | December | Average |
|----------------|----------------------------------|---------|----------|----------|---------|
| 1 | Solway Gate | .012 | .016 | .012 | .013 |
| 2 | Y-12 East Portal | .012 | .014 | .013 | .013 |
| 3 | Newcomb Road Oak Ridge, Tenn. | .015 | .013 | .013 | .014 |
| 4 | Gallaher Gate | .020 | .015 | .016 | .017 |
| 5 | White Wing Gate | .018 | .015 | .015 | .016 |
| Average | | | | | .015 |



INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name) **Mr. J. C. Hart**

Company

Location **ORNL**

Date **January 26, 1961**

Originating Dept.

Answering letter date

Copy to **Mr. K. W. Bahler**

Mr. L. B. Ealet

Mr. W. L. Richardson


Safety and Health Physics RC

Subject **News Release on
Environmental Surveys**

Attached are data for the news release on environmental surveys for the fourth quarter of 1960 for inclusion in the over-all report to the Commission. The tables include the data specified in the letter of March 21 from Mr. S. R. Sapirie to Mr. C. E. Center. In reviewing the past year's consolidated UGNC report, it appears as though a considerable portion of the information being furnished to you does not appear in the final reports. Accordingly, it is suggested that a meeting be arranged between our staff groups to determine if portions of the data presently being submitted might be deleted.

AFB:mhb

Attachments


A. P. Huber

For Immediate News Release

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
OCTOBER THROUGH DECEMBER, 1960

The results of environmental sampling by the ORGDP during the fourth quarter of 1960 indicate that the uranium concentrations in water, soil, and vegetation, both within the plant perimeters and the adjacent environs are not significantly different than the background value obtained in surrounding communities.

The average air-borne alpha activity in the plant environs as determined from the results of ten-minute spot samples at locations two and five miles from the plant was slightly above the normally low level. A single period of increased activity which occurred early in November was coincident with a pilot stage run being made with highly enriched uranium materials and was largely responsible for this increase. Following completion of the short run, background values were again rapidly re-established; modification of the involved process is being studied. Of the 427 eight-hour continuous samples obtained in those plant operations areas where stack or vent discharge of uranium materials is possible, less than 1% were above the maximum permissible concentration for occupational exposure and the average was only a small fraction of this concentration.

Environmental sampling data are summarized in Tables 1 through 3, and the sampling points for the outside environs are shown in Figure 1.

The average activity in Poplar Creek below the plant represents only 0.02% of the MPC specified in the NBS Handbook 69 for the discharge of natural uranium materials, and the level in the Clinch River reflecting the effects of all of the Oak Ridge Plants was only 0.01% of this MPC. Stream monitoring points are located both upstream and downstream from the discharge of plant wastes and sampled frequently to insure that concentrations at these points are within the values specified for the potable water supply of the general population in adjacent areas; there were no instances of concentrations above the specified limits for even as short a time as the weekly sampling cycle. Stream sampling locations are shown in Figure 2.

External gamma levels measured with a Geiger-Muller tube at a distance of three feet above the ground at 17 locations surrounding the ORGDP area averaged 0.020 mr/hr., which closely parallels the average background level of the country in general.

Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant
January 20, 1961

Table 1
 ENVIRONMENTAL SAMPLING - WATER
 OAK RIDGE GASEOUS DIFFUSION PLANT

Period: October-December, 1960

Period: October-December, 1960

| Location of Point | Type of Analysis Made | No. of Samples | Concentration ($\mu\text{c/cc} \times 10^{-8}$) | | | Average Plant Experience/ MPC |
|-----------------------|-----------------------|----------------|---|------|---|----------------------------------|
| | | | Plant Experience | | Maximum Permissible Concentration (MPC) | |
| | | | Low | High | | |
| Local Streams (Water) | | | | | | |
| <u>Poplar Creek</u> | | | | | | |
| Upstream | Uranium Concentration | 7 | 2.7 | 8.0 | 3.6 | 0.18% |
| Downstream | " | 7 | 0.21 | 0.56 | 0.31 | 0.02% |
| <u>Clinch River</u> | | | | | | |
| Upstream | " | 7 | <0.07 | 0.28 | 0.14 | <0.01% |
| Downstream | " | 7 | 0.07 | 1.5 | 0.27 | 0.01% |
| <u>Poplar Creek</u> | | | | | | |
| Upstream | Total Beta Activity | 7 | 0 | 8.6 | 3.8 | 0.19% |
| Downstream | " | 7 | 13.5 | 136 | 67 | 3.3% |
| <u>Clinch River</u> | | | | | | |
| Upstream | " | 10 | 9.4 | 186 | 92 | 28% |
| Downstream | " | 7 | 6.7 | 103 | 73 | 22% |

Normal Sampling Frequency: Continuous sampling, composited over one week.

* Measured mixture of radionuclides.

Table 2
 ENVIRONMENTAL SAMPLING - STREAM BOTTOM
 OAK RIDGE GASEOUS DIFFUSION PLANT

Period: October-December, 1960

| <u>Location of Point</u> | <u>Type of Analysis</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c/g} \times 10^{-7}$)</u> | |
|----------------------------|-------------------------|-----------------------|--|--|
| | | | <u>Plant Experience</u> | <u>Maximum Permissible Concentration (MPC)</u> |
| <u>Stream Bottom (Mud)</u> | | | | |
| <u>Poplar Creek</u> | | | | |
| Upstream | Uranium Concentration | 1 | 1281 | None specified. |
| Downstream | " | 1 | 105 | " |
| <u>Clinch River</u> | | | | |
| Upstream | " | 1 | 7 | " |
| Downstream | " | 1 | 14 | " |
| <u>Poplar Creek</u> | | | | |
| Upstream | Total Beta Activity | 1 | 37 | " |
| Downstream | " | 1 | 34 | " |
| <u>Clinch River</u> | | | | |
| Upstream | " | 1 | 23 | " |
| Downstream | " | 1 | 17 | " |

Normal Sampling Frequency: Grab sample, once each quarter at each location.

Table 3

ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: October-December, 1960

| Distance from Center of Plant | Type of Analysis Made | No. of Samples | Concentration ($\mu\text{c/cc} \times 10^{-13}$) | | | | | | Max. Permissible Concentration (MPC) | Average Concentration/ MPC |
|----------------------------------|--------------------------|-------------------|--|------|------|-----|------|----|---|----------------------------------|
| | | | Direction from Plant | | | | Av. | | | |
| | | | N | E | S | W | | | | |
| 2-Mile Radius* | Uranium Concentration | 42 | 1.16 | 0.81 | 1.69 | 0.0 | 1.11 | 20 | 5.6% | |
| 2-Mile Radius** | " | 16 | 270 | 312 | 39 | 180 | 188 | | | |
| 5-Mile Radius* | " | 40 | 7.10 | 2.54 | 1.62 | 2.6 | 3.06 | 20 | 15.3% | |
| 5-Mile Radius** | " | 16 | 169 | 93 | 49 | 169 | 110 | | | |

* Reflects normal levels existing over most of quarter.

** Reflects increased levels existing for a single sample period, the cause of which is yet to be determined.

The map illustrates the geographical context of the Ozark National Forest, specifically focusing on the area around the ORGDP (Ozark Ridge Game Development Project). Key features include:

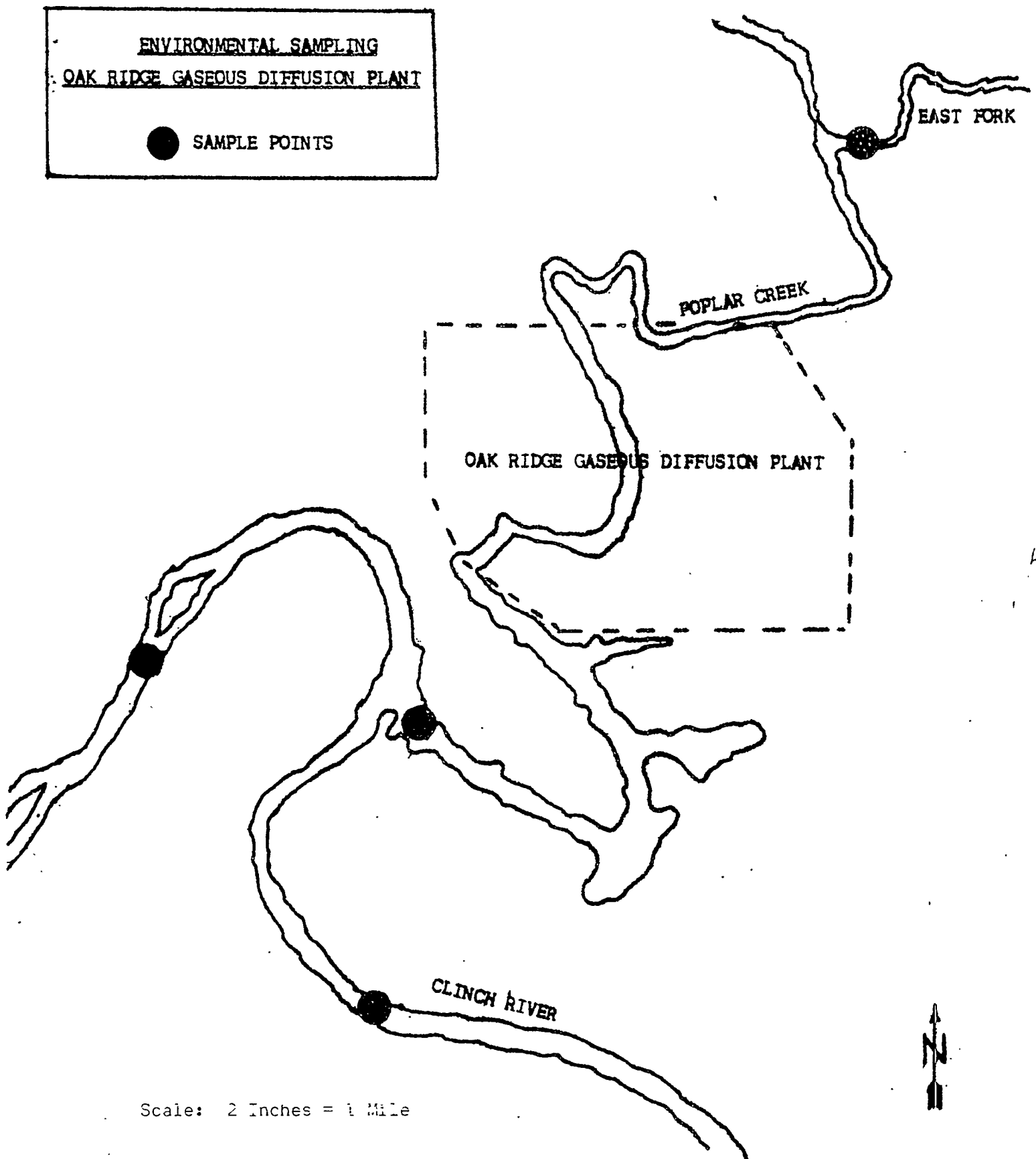
- Highways:** Highway #61 is shown running diagonally across the map. Other roads include Blair Road, White Wing Road, Oak Ridge Turnpike, and Gallager Road.
- Geographical Features:** The Sugar Grove Valley, Black Oak Ridge, and Dickie Valley are labeled. The map also shows the locations of several creeks and rivers, including Sugar Creek, Black Oak Creek, and the Ozark River.
- Landmarks and Points of Interest:** The ORGDP area is marked with a hatched pattern. Other points of interest include Mr. Plough Church, Lawsville, and Kingston.
- HPX Locations:** Eight specific locations are marked with black dots and labeled: HPX-11, HPX-12, HPX-13, HPX-14, HPX-15, HPX-16, HPX-17, and HPX-18. HPX-18 is noted as being on Highway #58, 12 miles from ORGDP.
- Orientation:** A north arrow is located in the upper left corner of the map.

SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

- Sampling Location - 5 Miles from Plant

FIGURE 2

News Release



UNION CARBIDE NUCLEAR COMPANY • DIVISION OF



CORPORATION

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

November 17, 1960

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie

Gentlemen:

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON
ENVIRONMENTAL LEVELS OF RADIOACTIVITY

As requested, we are enclosing eighty copies of the report for the third quarter, 1960, on Environmental Levels of Radioactivity for the Oak Ridge Area.

Yours very truly,

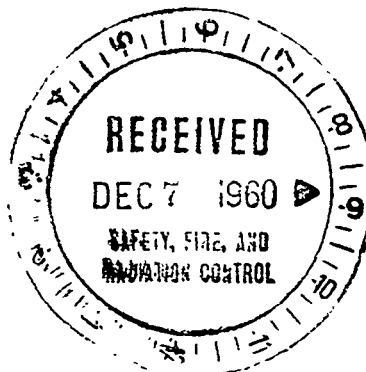
UNION CARBIDE NUCLEAR COMPANY

A handwritten signature in cursive script, appearing to read "Clark E. Center".

Clark E. Center
Vice President

CEC:HHA:dwh
Enclosures

cc w/encls.: H. H. Abee (10)
F. R. Bruce
F. L. Culler
L. B. Emlet (4)
H. F. Henry (2)
W. H. Jordan
K. Z. Morgan
J. A. Swartout (2)



November 14, 1960

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

Report for Third Quarter 1960

Data Compiled by: H. H. Abee

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to pits located in the Conasauga shale formation. Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

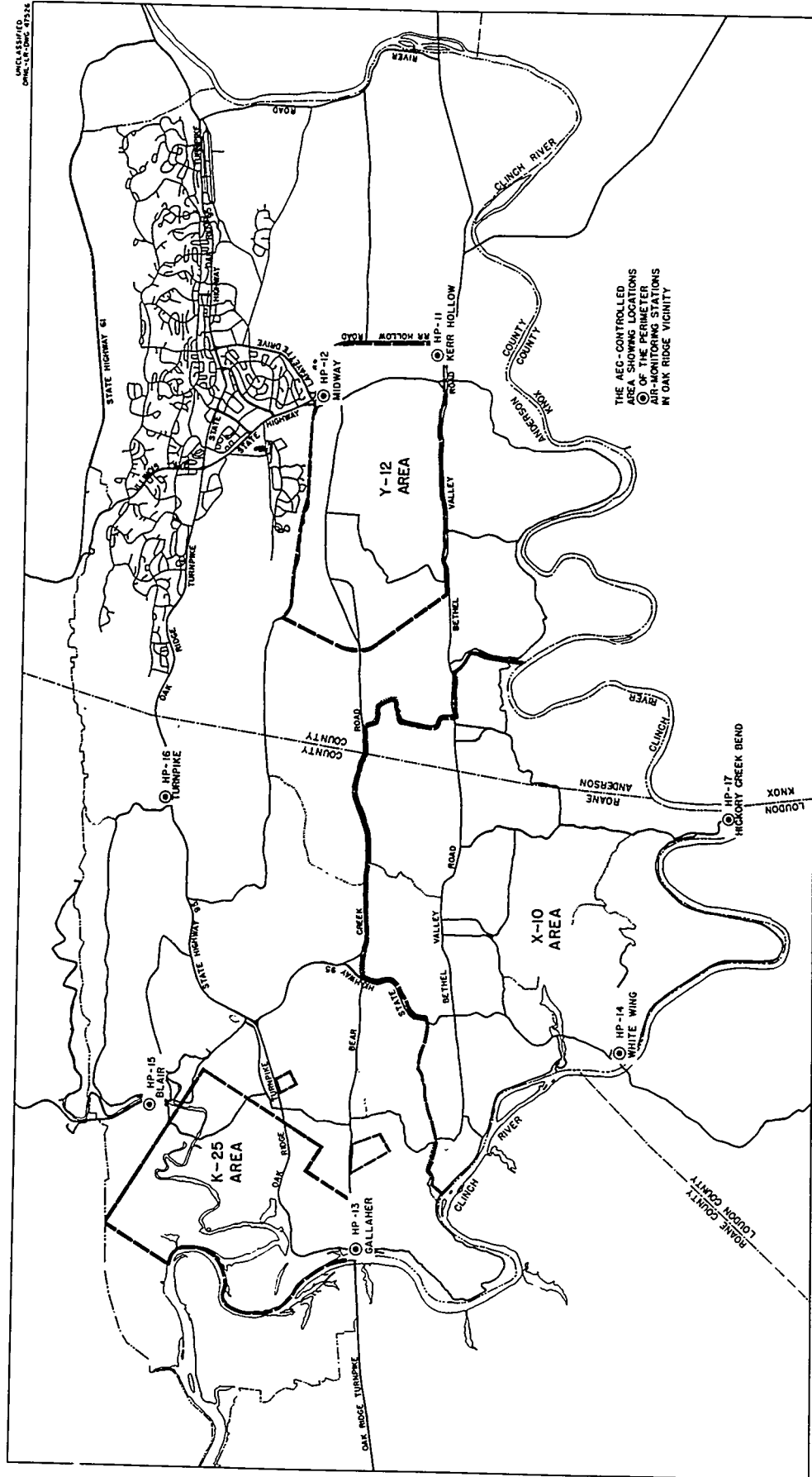
Air Monitoring

Atmospheric contamination and fall-out occurring in the general environment of East Tennessee are monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge operations on the immediate environment. A second system consists of eight stations encircling the Oak Ridge Area at distances of from 12 to 120 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur.

Sampling is carried out by passing air continuously through a filter paper. The filter paper will collect those particulates considered to be respirable. Data collected are accumulated and tabulated in average $\mu\text{c/cc}$ of air sampled.

Water Monitoring

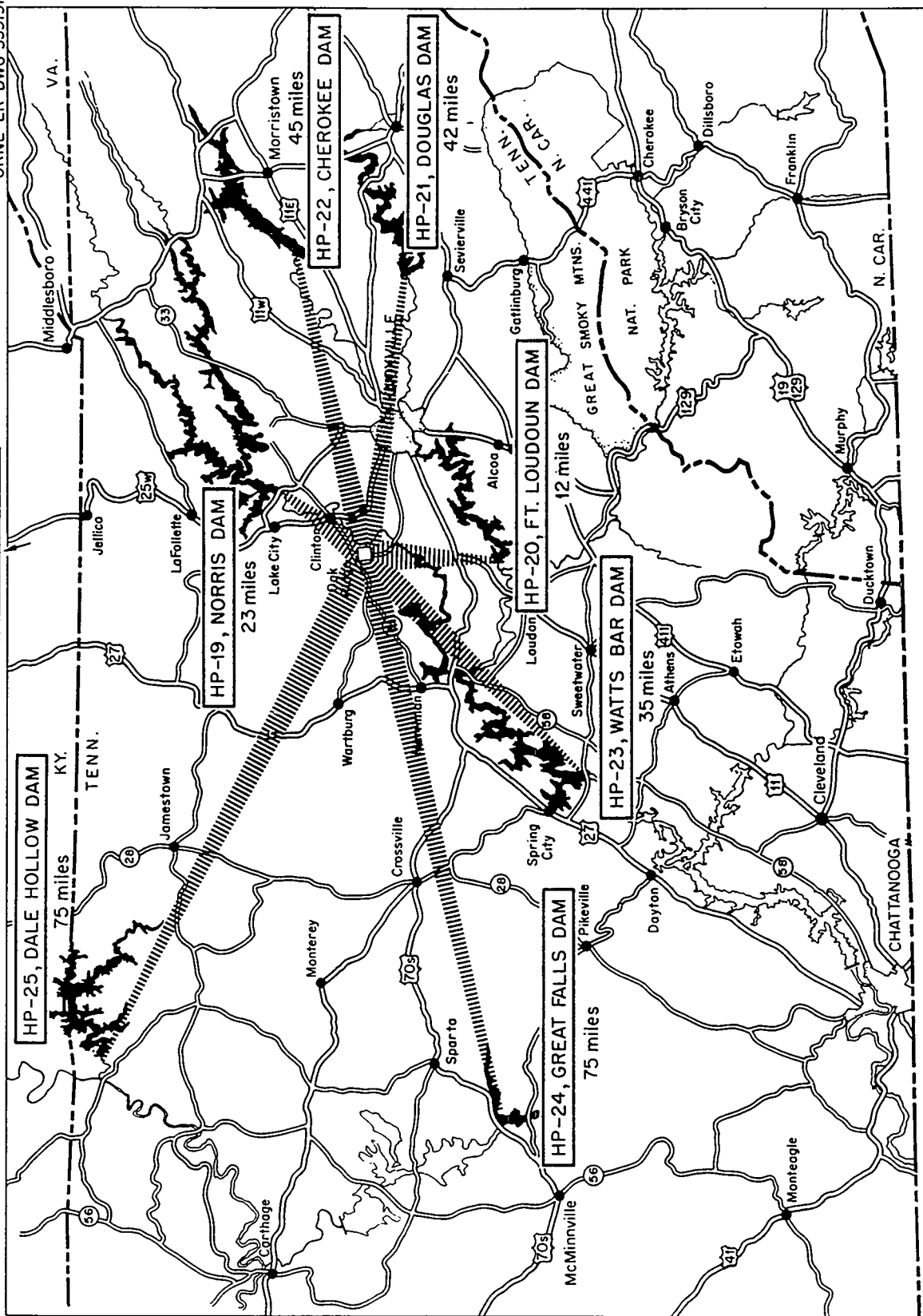
Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River.



STATION SITES FOR PERIMETER AIR MONITORING SYSTEM

Figure 1

HP-25, DALE HOLLOW DAM



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2

Releases are controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 3 and 4. Samples are taken in Poplar Creek and White Oak Creek prior to entry of the wastes into the public waterway and at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

The fraction of the total beta activity comprised by each isotope is determined from analysis of long-lived radionuclides contained in the effluent and a weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of radioactivity in the Clinch River are compared to the calculated $(MPC)_w$ value.

Gamma Measurements

External gamma radiation levels are measured monthly at five locations in the Oak Ridge Area. Measurements are taken with a Geiger-Muller tube at a distance of three feet above ground and the results are tabulated in terms of mr/hr.

Discussion of Data

Data on the environmental levels of radioactivity for the third quarter of 1960 in the Oak Ridge and surrounding areas are presented in Table I through Table V.

The air contamination levels for gross β activity as shown by the continuous air monitoring filter data for the immediate and remote environs of the plants were 0.09% and 0.08% respectively of the maximum permissible concentration for populations in the neighborhood of a controlled area. The levels measured during this period were not significantly different from those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network.

The calculated average concentration of radioactivity in the Clinch River at Mile 20.8, the point of entry of most waste materials, and at Mile 4.5, near Kingston, Tennessee, were 2.2×10^{-7} $\mu\text{c/cc}$ and 1.2×10^{-7} $\mu\text{c/cc}$ respectively. These values are 12.6% and 4.9% of the weighted average maximum permissible concentration as recommended by the National Committee

NOTES:

- ① WASTE DISPOSAL PITS IN CONASAUGA SHALE
- ② MOUTH OF WHITEOAK CREEK, C.I.R. Mi. 20.8 (TENNESSEE RIVER 20.8 MILES DOWNSTREAM)
- ③ WATER SUPPLY INTAKE (AEC INSTALLATION) DOWNSTREAM AT C.I.R. Mi. 13.2
- ④ USGS STREAM FLOW GAGING STATION UPSTREAM, C.I.R. Mi. 39.0

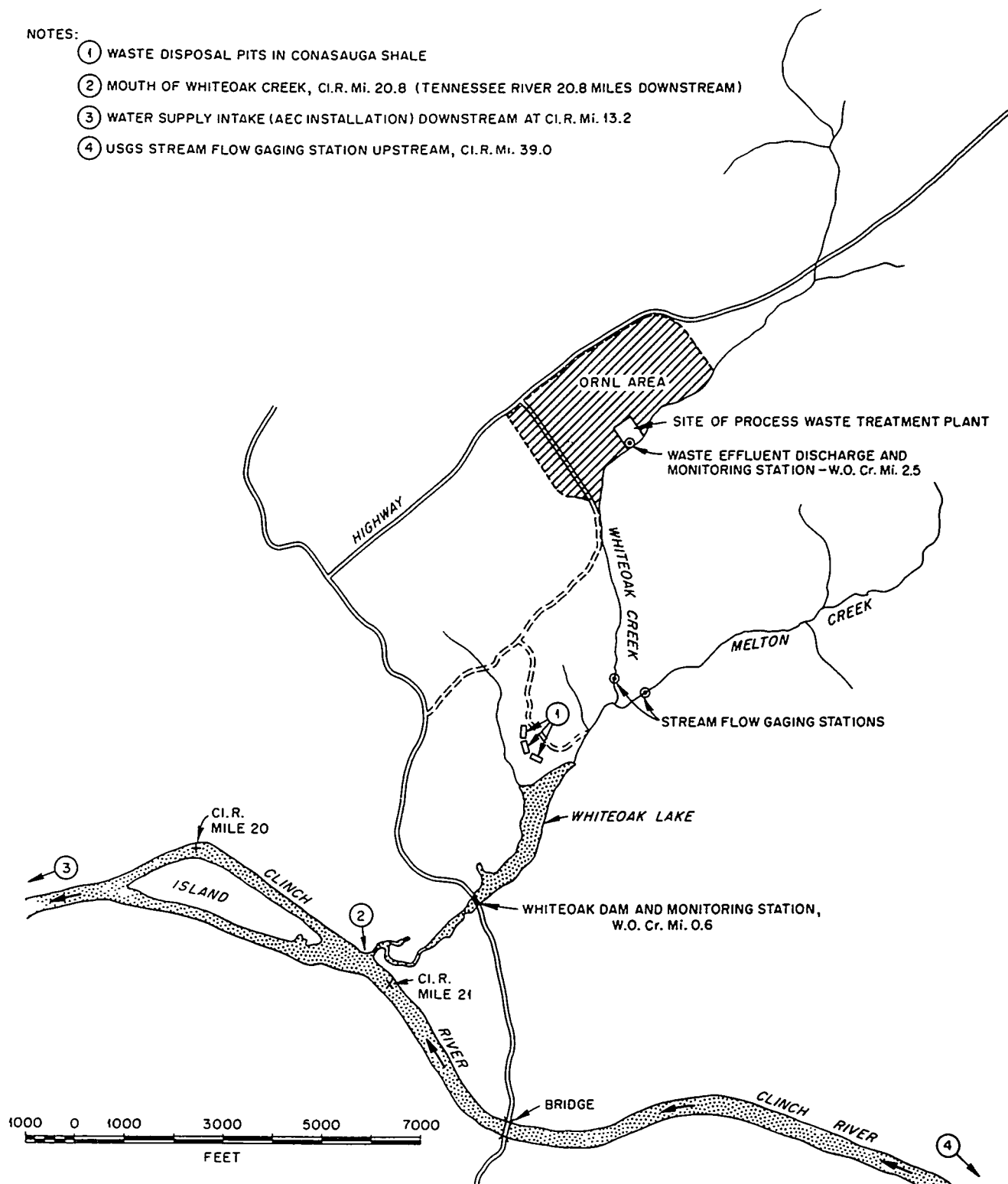


Figure 3

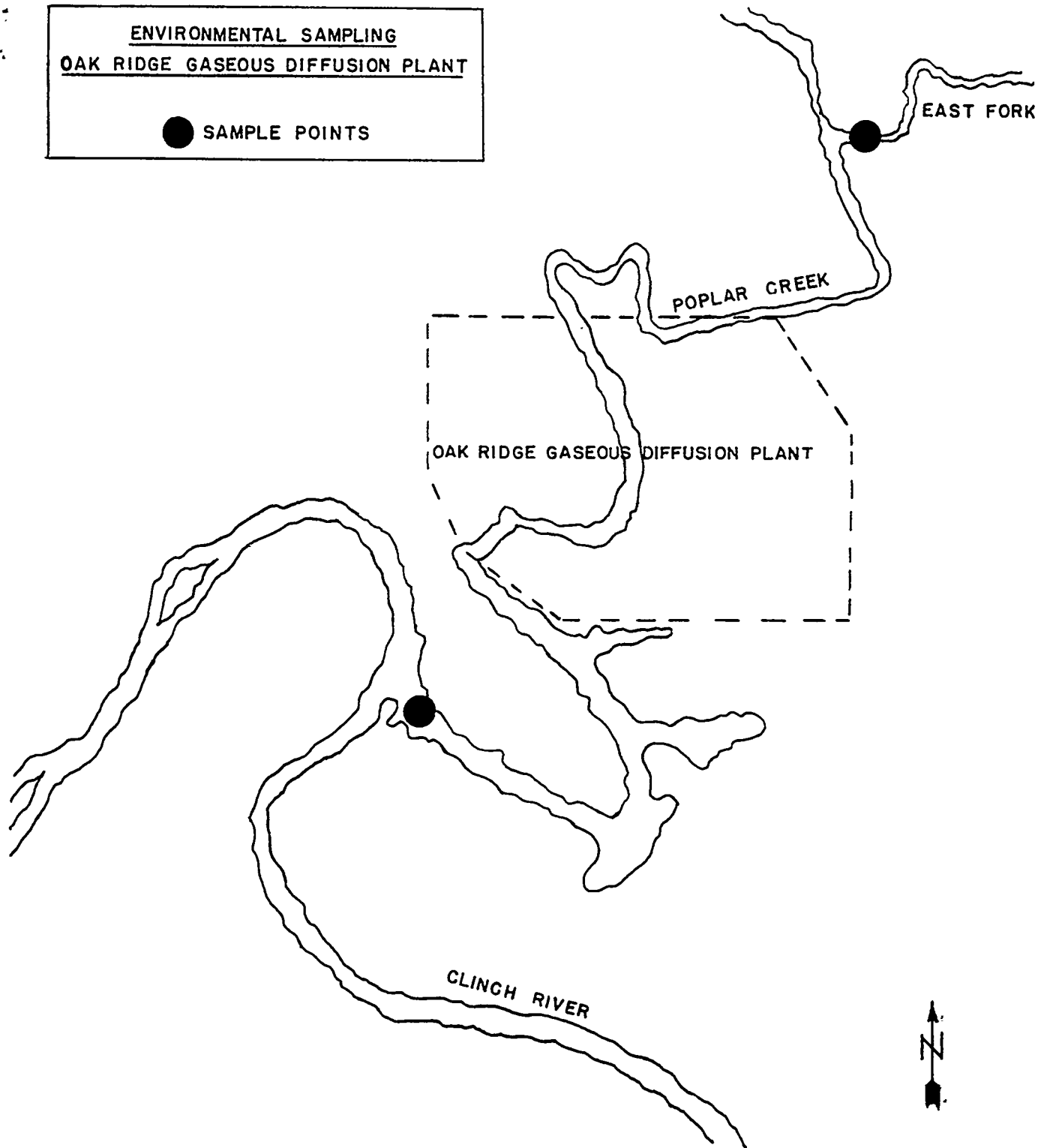


Figure 4

on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 1.9×10^{-11} $\mu\text{c/cc}$ which is 0.001% of the weighted average $(\text{MPC})_w$ value.

The average activity in Poplar Creek below the ORGDP for the quarter represents only 0.04% of the maximum permissible concentration for natural uranium.

External gamma radiation in the Oak Ridge Area averaged 0.015 mr/hr. This level is not significantly different from the average of the levels measured throughout the United States by the U. S. Public Health Service Radiation Surveillance Network.

Conclusion

From the data presented, it seems evident that the Oak Ridge Operations are contributing little to the air or ground contamination in the neighborhood of the area controlled by the Atomic Energy Commission.

Some radioactivity has been contributed to the Clinch River by the release of radioactive liquid wastes, but concentrations of radioactivity in the river are well below the maximum permissible concentration recommended by the NCRP for populations living in the vicinity of an atomic energy installation.

TABLE I

CONTINUOUS AIR MONITORING FILTER DATA

Units of 10^{-13} $\mu\text{c/cc}$ Third Quarter 1960

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average | % of (MPC) _a * |
|--|--------------------|-------------------------|---------|---------|---------|---------------------------|
| Perimeter Stations | | | | | | |
| HP-11 | Kerr Hollow Gate | 14 | 2.86 | 0.34 | 1.03 | 0.10 |
| HP-12 | Midway Gate | 14 | 2.81 | 0.08 | 0.99 | 0.10 |
| HP-13 | Gallaher Gate | 14 | 1.11 | 0.20 | 0.60 | 0.06 |
| HP-14 | White Wing Gate | 14 | 0.94 | 0.07 | 0.66 | 0.07 |
| HP-15 | Blair Gate | 14 | 1.94 | 0.43 | 1.11 | 0.11 |
| HP-16 | Turnpike Gate | 14 | 1.24 | 0.46 | 0.78 | 0.08 |
| HP-17 | Hickory Creek Bend | 14 | 1.40 | 0.20 | 0.78 | 0.08 |
| Average | | | | | 0.85 | 0.09 |
| Remote Stations | | | | | | |
| HP-19 | Norris Dam | 13 | 1.41 | 0.35 | 0.82 | 0.08 |
| HP-20 | Loudoun Dam | 13 | 1.58 | 0.49 | 0.87 | 0.09 |
| HP-21 | Douglas Dam | 13 | 1.38 | 0.16 | 0.80 | 0.08 |
| HP-22 | Cherokee Dam | 13 | 1.22 | 0.19 | 0.72 | 0.07 |
| HP-23 | Watts Bar Dam | 13 | 1.34 | 0.54 | 0.88 | 0.09 |
| HP-24 | Great Falls Dam | 13 | 2.39 | 0.41 | 0.97 | 0.10 |
| HP-25 | Dale Hollow Dam | 11 | 1.12 | 0.29 | 0.66 | 0.07 |
| HP-26 | Berea, Kentucky | 12 | 1.24 | 0.23 | 0.62 | 0.06 |
| Average | | | | | 0.80 | 0.08 |
| * (MPC) _a is taken to be 10^{-10} $\mu\text{c/cc}$ as recommended in NBS Handbook 69, Table 4, p. 94. | | | | | | |

TABLE II

CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8Units of 10^{-7} $\mu\text{c/cc}$ Third Quarter 1960

| Number of Samples Taken | Maximum | Minimum | Average | % of $(\text{MPC})_w$ |
|----------------------------|---------|---------|---------|-----------------------|
| 91 | 10.20 | 0.09 | 2.15 | 12.6 |

TABLE III
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER
Units of 10^{-8} $\mu\text{c/cc}$
Third Quarter 1960

| Location | Sr^{90} | Ce^{144} | Cs^{137} | $\text{Ru}^{103-106}$ | Co^{60} | Calculated Average Concentration of Gross Beta Activity | $(\text{MPC})_w^a$ | % of MPC |
|-----------------------|------------------|-------------------|-------------------|-----------------------|------------------|---|--------------------|----------|
| Mi. 37.5 | 0.1 | 0.06 | * | * | * | 0.1 | 15 | 0.7 |
| Mi. 20.8 ^b | 0.7 | 0.1 | 0.5 | 6.8 | 0.6 | 21.5 | 171 | 12.6 |
| Mi. 4.5 | 0.5 | 0.06 | 0.09 | 3.2 | 0.2 | 11.8 | 242 | 4.9 |

^a Weighted average $(\text{MPC})_w$ calculated for the mixture using $(\text{MPC})_w$ values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on levels of waste released and the dilution afforded by the river.

* None detected.

TABLE IV

CONCENTRATION OF RADIOACTIVITY IN POPLAR CREEK

Third Quarter 1960

| Location of Point | Type of Analysis Made | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | Percent (MPC) _w |
|---|-----------------------|----------------|-------------------------------------|---------|---------|----------------------------|
| | | | Maximum | Minimum | Average | |
| Upstream (East Fork) | Uranium Concentration | 13 | 11.8 | 0.14 | 1.85 | 0.09 |
| Downstream (Outfall) | " | 13 | 4.9 | 0.21 | 0.86 | 0.04 |
| Upstream (East Fork) | Total Beta Activity | 13 | 22.0 | 0 | 6.5 | 0.33 |
| Downstream (Outfall) | " | 13 | 63.0 | 0 | 19.0 | 0.95 |
| Normal Sampling Frequency: Continuous sampling; composited over one week. | | | | | | |

TABLE V

EXTERNAL GAMMA RADIATION LEVELS

mr/hr

Third Quarter 1960

| Station Number | Location | July | August | September | Average |
|-------------------|----------------------------|-------|--------|-----------|---------|
| 1 | Solway Gate | 0.015 | 0.014 | 0.014 | 0.014 |
| 2 | Y-12 East Portal | 0.014 | 0.015 | 0.011 | 0.013 |
| 3 | Newcomb Road, Oak Ridge | 0.014 | 0.015 | 0.013 | 0.014 |
| 4 | Gallaher Gate | 0.015 | 0.014 | 0.017 | 0.015 |
| 5 | White Wing Gate | 0.016 | 0.017 | 0.017 | 0.017 |
| Average | | | | | 0.015 |

UNION
CARBIDE

INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY •

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name) Mr. J. C. Hart
Company
Location RAL

Date October 26, 1960

Originating Dept.

Answering letter date

Copy to
Mr. K. A. Bahler
Mr. L. S. Emist
Mr. J. L. Richardson
Safety and Health Physics - MC ✓

Subject News release on Environmental
Surveys

Attached are data for the news release on environmental surveys for the third quarter of 1960 for inclusion in the over-all report to the Commission. The tables include the data specified in the letter of March 21 from Mr. C. E. Sopris to Mr. C. E. Lenter. We have not presented any data concerning the beta activity of our potable water supply since you will probably wish to include this as a part of your own environmental survey report.

A. P. Huber
A. P. Huber

HEF:mh

Attachment
Environmental Radioactivity Levels,
Oak Ridge Gaseous Diffusion Plant

For Immediate News Release

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JULY THROUGH SEPTEMBER, 1960

The results of environmental sampling by the ORGDP during the third quarter of 1960 indicate little, if any, radioactive contamination of air, soil, or water, either within the general plant area or in the plant environs. In all cases, measured values were only small fractions of the recommended permissible concentration.

The results of the 393 eight-hour air samples taken well within the plant area during the quarter revealed no indication of activities approaching the permissible limit within these boundaries for even short periods. Similarly, data obtained from sample points two miles and five miles from the plant indicate the average air activities to be only fractions of the MPC for general populations. Thus, it appears highly improbable that air contamination problems can occur outside of the ORGDP area.

Plant wastes released into the public waterways are sampled frequently to insure that the concentrations of these materials in the streams leaving the plant boundaries will not exceed the permissible limits in NBS Handbook No. 69 for drinking water of the general population. From results obtained at monitoring points which are located both upstream and downstream from ORGDP in Poplar Creek and the Clinch River, it was found that there were no instances of water release at the plant boundaries above the long-term maximum permissible concentration even for as short a time as the weekly sampling period. In fact, the average activity in Poplar Creek below the plant continues to represent only 0.04% of the maximum permissible concentration for the discharge of natural uranium; the corresponding levels in the Clinch River, which reflect the effects of all the Oak Ridge Plants, was only about half of this figure.

External gamma levels measured with a Geiger-Muller tube at a distance of three feet above the ground at 17 locations surrounding the ORGDP area average 0.020 mr/hr. This level is the same as the average background levels measured throughout the United States by the USPHS Radiation Surveillance Network.

Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant
October 26, 1960

ENVIRONMENTAL SAMPLING - WATER
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: July - September, 1960

| Location of Point | Type of Analysis Made | No. of Samples | Concentration ($\mu\text{c/cc} \times 10^{-8}$) | | | Maximum Permissible (MPC) | Average Plant Experience (MPC) |
|-----------------------|-----------------------|----------------|---|------|---------|---------------------------|--------------------------------|
| | | | Plant Experience | | Average | | |
| | | | Low | High | | | |
| Local Streams (Water) | | | | | | | |
| <u>Poplar Creek</u> | | | | | | | |
| Upstream | Uranium Concentration | 13 | 0.14 | 11.8 | 1.85 | 2000 | 0.09% |
| Downstream | " | 13 | 0.21 | 4.9 | 0.86 | 2000 | 0.04% |
| <u>Clinch River</u> | | | | | | | |
| Upstream | " | 13 | 0 | 0.49 | 0.14 | 2000 | < 0.01% |
| Downstream | " | 13 | 0 | 1.8 | 0.34 | 2000 | 0.02% |
| <u>Poplar Creek</u> | | | | | | | |
| Upstream | Total Beta Activity | 13 | 0 | 22 | 6.5 | 2000 | 0.33% |
| Downstream | " | 13 | 0 | 63 | 19 | 2000 | 0.95% |
| <u>Clinch River</u> | | | | | | | |
| Upstream | " | 13 | 1.8 | 160 | 31 | 349* | 8.9% |
| Downstream | " | 13 | 1.4 | 89 | 19 | 349* | 5.4% |

Normal Sampling Frequency: Continuous sampling; composited over one week.

* Measured mixture of radionuclides.

October 26, 1960

ENVIRONMENTAL SAMPLING - STREAM BOTTOM
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: July - September, 1960

| <u>Location of Point</u> | <u>Type of Analysis Made</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c/g.} \times 10^{-8}$)</u> | |
|----------------------------|------------------------------|-----------------------|---|----------------------------------|
| | | | <u>Plant Experience</u> | <u>Maximum Permissible (MPC)</u> |
| <u>Stream Bottom (Mud)</u> | | | | |
| <u>Poplar Creek</u> | | | | |
| Upstream | Uranium Concentration | 1 | 700 | None specified |
| Downstream | " | 1 | 700 | |
| <u>Clinch River</u> | | | | |
| Downstream | " | 1 | 350 | |
| <u>Poplar Creek</u> | | | | |
| Upstream | Total Beta Activity | 1 | 128 | None specified |
| Downstream | " | 1 | 525 | |
| <u>Clinch River</u> | | | | |
| Downstream | " | 1 | 606 | |

Normal Sampling Frequency: Grab sample, once each quarter at each location.

October 26, 1960

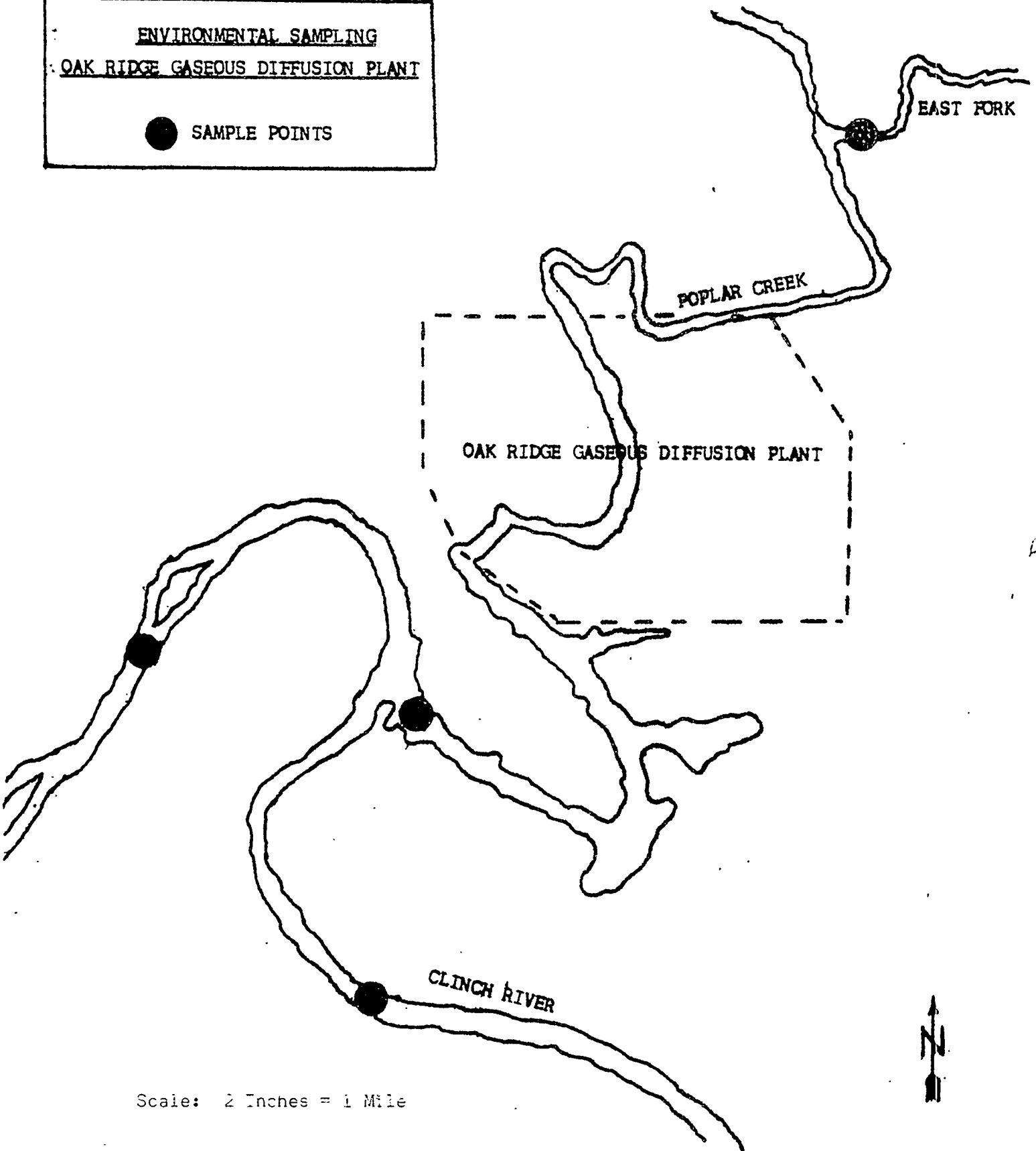
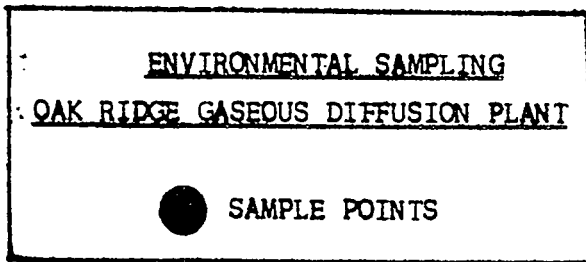
ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

Period: July - September, 1960

| <u>Distance From Center of Plant</u> | <u>Type of Analysis Made</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c/cc} \times 10^{-13}$)</u> | | | | <u>Average Concentration (MPC)</u> |
|--|----------------------------------|---------------------------|--|------------|----|--|--|
| | | | <u>Distance From Plant</u> | | | <u>Maximum Permiss- ible (MPC)</u> | |
| <u>N</u> | <u>E</u> | <u>S</u> | <u>W</u> | <u>Av.</u> | | | |
| 2.0 | 2.0 | 1.8 | 1.9 | 1.9 | 20 | | 10% |
| 1.8 | 2.3 | 5.4 | 4.1 | 3.4 | 20 | | 17% |

Normal Sampling Frequency: Random sampling; 10-minute and 8-hour samples.

News Release

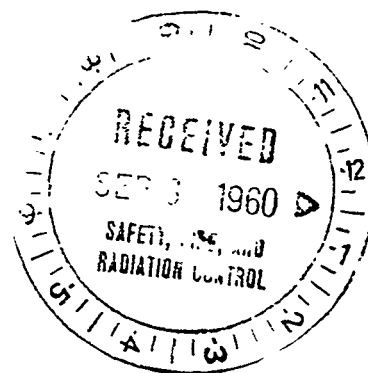


August 24, 1960

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

Report for Second Quarter, 1960

Data Compiled by: H. H. Abee



Introduction

This report is based on a continuation of the monitoring program described in "Environmental Levels of Radioactivity for the Oak Ridge Area, Report for 1959", dated May 28, 1960. The methods and techniques which were described in the previous report have been used in the preparation of this information.

Discussion of Data

Data on the environmental levels of radioactivity for the second quarter of 1960 in the Oak Ridge and surrounding areas are presented in Tables I through V.

The air contamination levels for gross β activity shown by the continuous air monitoring filter data for the immediate and remote environs of the plants was 0.16% and 0.17% respectively of the maximum permissible concentration for populations in the neighborhood of a controlled area. Fluctuations in the levels measured during the period were normal and levels did not vary significantly from those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network.

The probable average concentration of radioactivity in the Clinch River at Mile 20.8, the point of entry of most waste materials, and at Mile 4.5, near Kingston, Tennessee, were 5.6×10^{-7} $\mu\text{c/cc}$ and 1.2×10^{-7} $\mu\text{c/cc}$ respectively. These values are 23.2% and 7.9 % of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 2.8×10^{-11} $\mu\text{c/cc}$ which is 0.001% of the weighted average $(\text{MPC})_w$ value.

The average activity in Poplar Creek below the ORGDP for the quarter represents only 0.03% of the maximum permissible concentration for natural uranium.

External gamma radiation in the Oak Ridge area averaged 0.014 mr/hr and in the ORGDP area averaged 0.020 mr/hr. These levels do not differ significantly from the average of the levels measured throughout the United States by the Public Health Service Radiation Surveillance Network.

Table I

CONTINUOUS AIR MONITORING FILTER DATA

Units of 10^{-13} $\mu\text{c}/\text{cc}$ Second Quarter 1960

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average | % of (MPC) _a * |
|---|--------------------|-------------------------|---------|---------|---------|---------------------------|
| Perimeter Stations | | | | | | |
| HP-11 | Kerr Hollow Gate | 13 | 2.04 | 0.94 | 1.49 | 0.15 |
| HP-12 | Midway Gate | 13 | 4.22 | 0.64 | 1.95 | 0.20 |
| HP-13 | Gallaher Gate | 13 | 2.17 | 0.77 | 1.41 | 0.14 |
| HP-14 | White Wing Gate | 13 | 1.72 | 0.28 | 1.04 | 0.10 |
| HP-15 | Blair Gate | 13 | 3.74 | 1.38 | 2.42 | 0.24 |
| HP-16 | Turnpike Gate | 12 | 1.95 | 0.44 | 1.30 | 0.13 |
| HP-17 | Hickory Creek Bend | 13 | 2.52 | 0.21 | 1.72 | 0.17 |
| Average | | | | | 1.63 | 0.16 |
| Remote Stations | | | | | | |
| HP-19 | Norris Dam | 13 | 2.96 | 0.87 | 1.77 | 0.18 |
| HP-20 | Loudoun Dam | 13 | 3.11 | 0.94 | 1.91 | 0.19 |
| HP-21 | Douglas Dam | 13 | 2.61 | 0.86 | 1.58 | 0.16 |
| HP-22 | Cherokee Dam | 13 | 2.03 | 0.76 | 1.54 | 0.15 |
| HP-23 | Watts Bar Dam | 13 | 2.29 | 1.05 | 1.73 | 0.17 |
| HP-24 | Great Falls Dam | 13 | 2.44 | 0.95 | 1.89 | 0.19 |
| HP-25 | Dale Hollow Dam | 13 | 2.01 | 0.64 | 1.60 | 0.16 |
| HP-26 | Berea, Kentucky | 10 | 1.45 | 0.08 | 0.93 | 0.09 |
| Average | | | | | 1.65 | 0.17 |
| * (MPC) _a is taken to be 10^{-10} $\mu\text{c}/\text{cc}$ as recommended in NBS Handbook 69, Table 4, p. 94. | | | | | | |

TABLE II

PROBABLE AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8Units of 10^{-7} $\mu\text{c/cc}$ Second Quarter 1960

| Number of Samples Taken | Maximum | Minimum | Average | % of (MPC) _w |
|----------------------------|---------|---------|---------|----------------------------|
| 83 | 22.77 | 0.19 | 5.6 | 23.2 |

TABLE III

AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVERUnits of 10^{-8} $\mu\text{c/cc}$ Second Quarter 1960

| Location | Sr^{90} | Ce^{144} | Cs^{137} | $\text{Ru}^{103-106}$ | Co^{60} | Probable Average Concentration of Radioactivity | $(\text{MPC})_w^a$ | % of MPC |
|-----------------------|------------------|-------------------|-------------------|-----------------------|------------------|---|--------------------|----------|
| Mi. 37.5 | .10 | .05 | | | | .3 | 29 | 1 |
| Mi. 20.8 ^b | .8 | .2 | .4 | 16.3 | 1.2 | 56.2 | 243 | 23.2 |
| Mi. 4.5 | .7 | .09 | .06 | 9.1 | .05 | 11.8 | 149 | 7.9 |

^a Weighted average $(\text{MPC})_w$ calculated for the mixture using $(\text{MPC})_w$ values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on the levels of waste released and the dilution afforded by the river.

TABLE IV

CONCENTRATION OF RADIOACTIVITY IN POPLAR CREEK

Second Quarter 1960

| Location of Point | Type of Analysis Made | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | Percent (MPC) |
|---|-----------------------|----------------|-------------------------------------|---------|---------|---------------|
| | | | Maximum | Minimum | Average | |
| Upstream (East Fork) | Uranium Concentration | 13 | 13.0 | 2.4 | 5.7 | 0.29 |
| Downstream (Outfall) | " | 13 | 1.3 | 0.4 | 0.6 | 0.03 |
| Upstream (East Fork) | Total Beta Activity | 13 | 21.2 | 2.7 | 7.1 | 0.36 |
| Downstream (Outfall) | " | 13 | 171.5 | 5.4 | 39.9 | 2.00 |
| Normal Sampling Frequency: Continuous sampling; composited over one week. | | | | | | |

TABLE V.

EXTERNAL GAMMA RADIATION LEVELS

mr/hr

Second Quarter 1960

| Station Number | Location | April | May | June | Average |
|-------------------|----------------------------|-------|------|------|---------|
| 1 | Solway Gate | * | .014 | .014 | .014 |
| 2 | Y-12 East Portal | * | .014 | .013 | .014 |
| 3 | Newcomb Road, Oak Ridge | * | .014 | * | .014 |
| 4 | Gallaher Gate | * | .014 | .013 | .014 |
| 5 | White Wing Gate | * | .016 | .013 | .014 |
| Average | | | | | .014 |
| * None taken | | | | | |

UNION
CARBIDE

INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P. OAK RIDGE, TENNESSEE

To (Name)
Company
Location

Mr. J. C. Hart

Date July 20, 1960

Originating Dept.

Answering letter date

Copy to

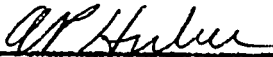
Mr. K. W. Bahler
Mr. L. B. Emlet
Mr. W. L. Richardson

Subject News Release on
Environmental Surveys

Safety and Health Physics RC ✓

Attached are data for the news release on environmental surveys for the second quarter of 1960 for inclusion in the over-all report to the Commission. The tables include the data specified in the letter of March 21 from Mr. S. R. Sapirle to Mr. C. E. Center. We have not presented any data concerning the beta activity of our potable water supply since you will probably wish to include this as a part of your own environmental survey report.

WLR:mhb


A. P. Huber

Attachment

Environmental Radioactivity Levels,
Oak Ridge Gaseous Diffusion Plant

For Immediate News Release

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
APRIL THROUGH JUNE, 1960

The results of environmental sampling by the ORGDP during the second quarter of 1960 indicate little, if any, radioactive material contamination of air, soil, or water, either within the general plant area or in the plant environs. In all cases, values measured were only small fractions of the recommended maximum permissible concentrations.

With respect to the air-borne contamination, monitoring of the outside air well within the plant area (415 eight-hour samples during the quarter) revealed no indication of activities approaching the permissible limits within these boundaries for even short periods. Thus, it appears highly improbable that any significant air contamination problems can occur outside the ORGDP area. This conclusion is further substantiated by the data obtained from sample points two miles and five miles from the plant, these indicating average air activities which were only fractions of the MPC for general populations.

Plant wastes released into public waterways are sampled periodically to insure that the concentration of these materials in the streams leaving the plant boundaries does not exceed the permissible limits given in NBS Handbook No. 69 for drinking water of the general population. Monitoring points in Poplar Creek and Clinch River are both upstream and downstream from ORGDP. There were no instances of water release at the plant boundaries above the long-term maximum permissible concentration even for as short a time as the weekly sampling period, and the average activity in Poplar Creek below the plant continues to represent only 0.03% of the maximum permissible concentration for the discharge of natural uranium; the levels in the Clinch River which reflect the effects of all of the Oak Ridge Plants were much less than this figure.

External gamma radiation levels measured with a Geiger-Muller tube at a distance of three feet above ground at 22 locations surrounding the ORGDP area averaged 0.020 mr/hour. This value is the same as the average background levels measured throughout the United States by the USPHS Radiation Surveillance Network.

Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant

July 18, 1960

ENVIRONMENTAL SAMPLING - WATER
OAK RIDGE GASEOUS DIFFUSION PLANT

Period April - June, 1960

| Location of Point | Type of Analysis Made | No. of Samples | Concentration ($\mu\text{c/cc} \times 10^{-8}$) | | | Av. Pl. Exp./MPC |
|------------------------------|-----------------------|----------------|---|------------------|------|------------------|
| | | | Plant Experience | Max. Permissible | | |
| | | | Low | High | Av. | (MPC) |
| <u>Local Streams (Water)</u> | | | | | | |
| <u>Poplar Creek</u> | | | | | | |
| Upstream | Uranium Concentration | 13 | 2.4 | 13.0 | 5.7 | 2000 |
| Downstream | | " | 13 | 0.4 | 1.3 | 0.6 |
| <u>Clinch River</u> | | | | | | |
| Upstream | " | 13 | 0.07 | 1.2 | 0.2 | 2000 |
| Downstream | " | 13 | 0.07 | 0.8 | 0.3 | 2000 |
| <u>Poplar Creek</u> | | | | | | |
| Upstream | Total Beta Activity | 13 | 2.7 | 21.2 | 7.1 | 2000 |
| Downstream | " | 13 | 5.4 | 171.5 | 39.9 | 2000 |
| <u>Clinch River</u> | | | | | | |
| Upstream | " | 13 | 8.6 | 265.5 | 70.2 | 249* |
| Downstream | " | 13 | 4.5 | 207.0 | 52.7 | 249* |

Normal Sampling Frequency: Continuous sampling; composited over one week.

* Measured mixture of radionuclides.

News Release

-3-

July 18, 1960

ENVIRONMENTAL SAMPLING - STREAM BOTTOM
OAK RIDGE GASEOUS DIFFUSION PLANT

Period April - June, 1960

| <u>Location of Point</u> | <u>Type of Analysis Made</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c}/\text{g.} \times 10^{-8}$)</u> | |
|----------------------------|------------------------------|-----------------------|--|-------------------------------|
| | | | <u>Plant Experience</u> | <u>Max. Permissible (MPC)</u> |
| <u>Stream Bottom (Mud)</u> | | | | |
| <u>Poplar Creek</u> | | | | |
| Upstream | Uranium Concentration | 1 | 6,440 | None specified |
| Downstream | " | 1 | 630 | |
| <u>Clinch River</u> | | | | |
| Downstream | " | 1 | 1,120 | |
| <u>Poplar Creek</u> | | | | |
| Upstream | Total Beta Activity | 1 | 12,190 | None specified |
| Downstream | " | 1 | 21,740 | |
| <u>Clinch River</u> | | | | |
| Downstream | " | 1 | 30,240 | |

Normal Sampling Frequency: Grab sample, once each quarter at each location.

ENVIRONMENTAL SAMPLING - AIR
OAK RIDGE GASEOUS DIFFUSION PLANT

Period April - June, 1960

| Distance From Center of Plant | Type of Analysis Made | No. of Samples | Concentration ($\mu\text{c/cc} \times 10^{-13}$) | | | | | Av. Concentrations/MPC | |
|----------------------------------|----------------------------|-------------------|--|-----|-----|-----|---------------------------|---------------------------|-------|
| | | | Direction From Plant | | | | Max. Permissible (MPC) | | |
| | | | N | E | S | W | | | Av. |
| 2-Mile Radius | Uranium Concen- tration | 16 | 4.5 | 3.8 | 6.0 | 4.5 | 4.7 | 20 | 23.5% |
| 5-Mile Radius | " | 16 | 2.0 | 3.3 | 3.0 | 0.0 | 2.1 | 20 | 10.5% |

Normal Sampling Frequency: Random sampling; 10-minute and 8-hour samples.

May 28, 1960

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

Report for First Quarter, 1960

Data Compiled by: H. H. Abee

Introduction

This report is based on a continuation of the monitoring program described in "Environmental Levels of Radioactivity for the Oak Ridge Area, Report for 1959", dated May 28, 1960. The method and techniques which were described in the previous report have been used in the preparation of this information.

Discussion of Data

Data on the environmental levels of radioactivity for the first quarter of 1960 in the Oak Ridge and surrounding areas are presented in Tables I through IX.

The air contamination level shown by the continuous air monitoring filter data for the immediate and remote environs of the plant was 0.11% of the maximum permissible concentration for populations in the neighborhood of a controlled area. There were no large fluctuations in the levels measured during the period and levels did not vary significantly from background levels measured by the U. S. Public Health Service in other areas of the United States.

The probable average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of the wastes, and at Mile 4.5, near Kingston, Tennessee, were $10.3 \times 10^{-7} \mu\text{c/cc}$ and $7.8 \times 10^{-7} \mu\text{c/cc}$ respectively. These values are 26.9% and 16.4% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was $8 \times 10^{-11} \mu\text{c/cc}$ which is 0.002% of the weighted average (MPC)_w value.

The average activity in Poplar Creek below the ORGDP for the quarter continues to represent only 0.02% of the maximum permissible concentration for natural uranium.

External gamma radiation in the Oak Ridge area averaged 0.017 mr/hr. This level does not differ significantly from the average of the levels measured throughout the United States by the Public Health Service Radiation Surveillance Network.

TABLE I
CONTINUOUS AIR MONITORING FILTER DATA

Units of 10^{-13} $\mu\text{c}/\text{cc}$

First Quarter 1960

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average | % of (MPC) _a |
|--------------------|--------------------|-------------------------|---------|---------|---------|-------------------------|
| Perimeter Stations | | | | | | |
| HP-11 | Kerr Hollow Gate | 13 | 1.54 | 0.56 | 1.13 | 0.11 |
| HP-12 | Midway Gate | 13 | 1.36 | 0.59 | 0.98 | 0.10 |
| HP-13 | Gallaher Gate | 13 | 1.66 | 0.63 | 1.06 | 0.11 |
| HP-14 | White Wing Gate | 13 | 1.34 | 0.45 | 0.90 | 0.09 |
| HP-15 | Blair Gate | 13 | 2.99 | 0.48 | 1.31 | 0.13 |
| HP-16 | Turnpike Gate | 13 | 1.67 | 0.24 | 0.99 | 0.10 |
| HP-17 | Hickory Creek Bend | 13 | 1.83 | 0.29 | 1.21 | 0.12 |
| Average | | | | | 1.08 | 0.11 |
| Remote Stations | | | | | | |
| HP-19 | Norris Dam | 13 | 1.95 | 0.50 | 1.24 | 0.12 |
| HP-20 | Loudoun Dam | 13 | 2.69 | 0.18 | 1.17 | 0.12 |
| HP-21 | Douglas Dam | 13 | 1.86 | 0.66 | 1.07 | 0.11 |
| HP-22 | Cherokee Dam | 13 | 2.03 | 0.54 | 1.32 | 0.13 |
| HP-23 | Watts Bar Dam | 13 | 2.73 | 0.37 | 1.25 | 0.13 |
| HP-24 | Great Falls Dam | 13 | 1.92 | 0.59 | 1.19 | 0.12 |
| HP-25 | Dale Hollow Dam | 13 | 1.71 | 0.34 | 1.09 | 0.11 |
| HP-26 | Berea, Kentucky | 13 | 1.64 | 0.12 | 0.80 | 0.08 |
| Average | | | | | 1.14 | 0.11 |

(MPC)_a is taken to be 10^{-10} $\mu\text{c}/\text{cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.

TABLE II

CONTINUOUS AIR MONITORING FILTER DATA

Particles/1000 cu. ft. of Air Sampled

First Quarter 1960

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average |
|--------------------|--------------------|-------------------------|---------|---------|---------|
| Perimeter Stations | | | | | |
| HP-11 | Kerr Hollow Gate | 13 | 0.22 | 0.00 | 0.05 |
| HP-12 | Midway Gate | 13 | 0.16 | 0.00 | 0.03 |
| HP-13 | Gallaher Gate | 13 | 0.12 | 0.00 | 0.02 |
| HP-14 | White Wing Gate | 13 | 0.16 | 0.00 | 0.03 |
| HP-15 | Blair Gate | 13 | 0.50 | 0.00 | 0.08 |
| HP-16 | Turnpike Gate | 13 | 0.19 | 0.00 | 0.03 |
| HP-17 | Hickory Creek Bend | 13 | 0.23 | 0.00 | 0.02 |
| Average | | | | | 0.04 |
| Remote Stations | | | | | |
| HP-19 | Norris Dam | 13 | 0.38 | 0.00 | 0.04 |
| HP-20 | Loudoun Dam | 13 | 0.22 | 0.00 | 0.02 |
| HP-21 | Douglas Dam | 13 | 0.16 | 0.00 | 0.03 |
| HP-22 | Cherokee Dam | 13 | 0.40 | 0.00 | 0.06 |
| HP-23 | Watts Bar Dam | 13 | 0.13 | 0.00 | 0.02 |
| HP-24 | Great Falls Dam | 13 | 0.20 | 0.00 | 0.04 |
| HP-25 | Dale Hollow Dam | 13 | 0.36 | 0.00 | 0.05 |
| HP-26 | Berea, Kentucky | 13 | 0.20 | 0.00 | 0.03 |
| Average | | | | | 0.04 |

TABLE III

GUMMED PAPER FALL-OUT DATA

Units of 10^{-4} $\mu\text{c/sq. ft.}$ First Quarter 1960

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average |
|--------------------|--------------------|-------------------------|---------|---------|---------|
| Perimeter Stations | | | | | |
| HP-11 | Kerr Hollow Gate | 13 | 2.99 | 0.23 | 0.95 |
| HP-12 | Midway Gate | 13 | 3.31 | 0.15 | 0.97 |
| HP-13 | Gallaher Gate | 13 | 2.11 | 0.17 | 0.71 |
| HP-14 | White Wing Gate | 13 | 3.14 | 0.15 | 0.73 |
| HP-15 | Blair Gate | 13 | 3.45 | 0.14 | 1.30 |
| HP-16 | Turnpike Gate | 13 | 2.68 | 0.36 | 0.95 |
| HP-17 | Hickory Creek Bend | 13 | 2.93 | 0.06 | 0.67 |
| Average | | | | | 0.90 |
| Remote Stations | | | | | |
| HP-19 | Norris Dam | 12 | 2.39 | 0.04 | 0.64 |
| HP-20 | Loudoun Dam | 13 | 3.03 | 0.05 | 0.65 |
| HP-21 | Douglas Dam | 13 | 2.70 | 0.11 | 0.63 |
| HP-22 | Cherokee Dam | 13 | 2.90 | 0.08 | 0.57 |
| HP-23 | Watts Bar Dam | 13 | 3.38 | 0.02 | 0.65 |
| HP-24 | Great Falls Dam | 13 | 3.04 | 0.03 | 0.70 |
| HP-25 | Dale Hollow Dam | 13 | 1.65 | 0.05 | 0.59 |
| HP-26 | Berea, Kentucky | 13 | 1.54 | 0.16 | 0.51 |
| Average | | | | | 0.62 |

TABLE IV

GUMMED PAPER FALL-OUT DATA

Particles/sq. ft.

First Quarter 1960

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average |
|--------------------|--------------------|----------------------------|---------|---------|---------|
| Perimeter Stations | | | | | |
| HP-11 | Kerr Hollow Gate | 13 | 118.00 | 0.00 | 13.92 |
| HP-12 | Midway Gate | 13 | 83.00 | 0.00 | 11.23 |
| HP-13 | Gallaher Gate | 13 | 109.00 | 0.00 | 13.46 |
| HP-14 | White Wing Gate | 13 | 114.00 | 0.00 | 13.31 |
| HP-15 | Blair Gate | 13 | 80.00 | 0.00 | 10.77 |
| HP-16 | Turnpike Gate | 13 | 117.00 | 0.00 | 14.15 |
| HP-17 | Hickory Creek Bend | 13 | 116.00 | 0.00 | 14.15 |
| Average | | | | | 13.00 |
| Remote Stations | | | | | |
| HP-19 | Norris Dam | 13 | 121.00 | 0.00 | 13.38 |
| HP-20 | Loudoun Dam | 13 | 104.00 | 0.00 | 12.77 |
| HP-21 | Douglas Dam | 13 | 105.00 | 0.00 | 14.08 |
| HP-22 | Cherokee Dam | 13 | 62.00 | 0.00 | 7.46 |
| HP-23 | Watts Bar Dam | 13 | 110.00 | 0.00 | 12.69 |
| HP-24 | Great Falls Dam | 13 | 63.00 | 0.00 | 7.85 |
| HP-25 | Dale Hollow Dam | 13 | 80.00 | 0.00 | 9.69 |
| HP-26 | Berea, Kentucky | 13 | 46.00 | 0.00 | 5.82 |
| Average | | | | | 10.47 |

TABLE V

RADIOACTIVITY IN RAIN WATER

Units of 10^{-7} $\mu\text{c/cc}$ First Quarter 1960

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average |
|--------------------|--------------------|-------------------------|---------|---------|---------|
| Perimeter Stations | | | | | |
| HP-11 | Kerr Hollow Gate | 11 | 2.95 | 0.10 | 0.54 |
| HP-12 | Midway Gate | 11 | 1.54 | 0.15 | 0.56 |
| HP-13 | Gallaher Gate | 11 | 0.94 | 0.07 | 0.44 |
| HP-14 | White Wing Gate | 11 | 0.85 | 0.01 | 0.30 |
| HP-15 | Blair Gate | 11 | 0.90 | 0.22 | 0.43 |
| HP-16 | Turnpike Gate | 11 | 0.88 | 0.13 | 0.53 |
| HP-17 | Hickory Creek Bend | 11 | 1.35 | 0.13 | 0.48 |
| Average | | | | | 0.47 |
| Remote Stations | | | | | |
| HP-19 | Norris Dam | 11 | 3.73 | 0.00 | 0.71 |
| HP-20 | Loudoun Dam | 11 | 1.37 | 0.04 | 0.53 |
| HP-21 | Douglas Dam | 11 | 1.29 | 0.16 | 0.60 |
| HP-22 | Cherokee Dam | 11 | 1.48 | 0.13 | 0.46 |
| HP-23 | Watts Bar Dam | 11 | 1.68 | 0.18 | 0.58 |
| HP-24 | Great Falls Dam | 11 | 2.09 | 0.20 | 0.83 |
| HP-25 | Dale Hollow Dam | 12 | 1.01 | 0.23 | 0.52 |
| HP-26 | Berea, Kentucky | 12 | 5.77 | 0.07 | 0.99 |
| Average | | | | | 0.65 |

TABLE VI

PROBABLE AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

Units of 10^{-7} $\mu\text{c/cc}$

First Quarter 1960

| Number of Samples Taken | Maximum | Minimum | Average | % of $(\text{MPC})_w$ |
|----------------------------|---------|---------|---------|-----------------------|
| 91 | 21.3 | 3.3 | 10.3 | 26.9 |

TABLE VII

AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVERFirst Quarter 1960

| Location | Sampling Period | Units of 10^{-8} $\mu\text{c/cc}$ | | | | | Probable Avg. Concn. of Radioactivity $\mu\text{c/cc} \times 10^{-8}$ | (MPC) ^a 10^{-6} w $\mu\text{c/cc}$ | % of MPC |
|-----------------------|--------------------|-------------------------------------|-------------------|-------------------|-----------------------|------------------|---|---|----------|
| | | Sr ⁹⁰ | Ce ¹⁴⁴ | Cs ¹³⁷ | Ru ¹⁰³⁻¹⁰⁶ | Co ⁶⁰ | | | |
| Clinch River | | | | | | | | | |
| Mi. 37.5 | 10/1/59 - 1/29/60 | 0.11 | 0.10 | * | * | * | 0.45 | 0.21 | 2.14 |
| Mi. 20.8 ^b | 12/28/59 - 3/27/60 | 0.67 | 1.62 | 1.48 | 44.75 | 3.45 | 103.2 | 3.83 | 26.9 |
| Mi. 4.5 | 11/4/59 - 1/27/60 | 0.91 | 0.36 | 0.41 | 69.68 | 0.86 | 77.5 | 4.72 | 16.4 |

^a Weighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on the levels of waste released and the dilution afforded by the river.

* None detected.

^a Weighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on the levels of waste released and the dilution afforded by the river.

* None detected.

TABLE VIII

EXTERNAL GAMMA RADIATION LEVELS

mr/hr

First Quarter 1960

| Station Number | Location | January | February | March | Average |
|----------------|---------------------------|---------|------------|-------|---------|
| 1 | Solway Gate | .018 | None taken | .015 | .017 |
| 2 | Y-12 East Portal | .018 | None taken | .012 | .015 |
| 3 | Newcomb Road Oak Ridge | .015 | None taken | .013 | .014 |
| 4 | Gallaher Gate | .025 | None taken | .018 | .022 |
| 5 | White Wing Gate | .019 | None taken | .014 | .017 |
| Average | | | | | .017 |

TABLE IX

CONCENTRATION OF RADIOACTIVITY IN POPLAR CREEK

First Quarter 1960

| Location of Point | Type of Analysis Made | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | Percent (MPC) _w |
|---|-----------------------|----------------|-------------------------------------|---------|---------|----------------------------|
| | | | Maximum | Minimum | Average | |
| Upstream (East Fork) | Uranium Concentration | 13 | 7.0 | 1.6 | 4.4 | 0.22 |
| Downstream (Outfall) | " | 13 | 1.0 | 0.2 | 0.5 | 0.02 |
| Upstream (East Fork) | Total Beta Activity | 13 | 226.4 | 7.7 | 35.6 | 1.8 |
| Downstream (Outfall) | " | 13 | 129.2 | 27.9 | 74.7 | 3.5 |
| Normal Sampling Frequency: Continuous sampling; composited over one week. | | | | | | |

For Immediate News Release

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
JANUARY THROUGH MARCH, 1960

The results of environmental sampling by the ORGDP during the first quarter of 1960 indicate little, if any, radioactive material contamination of air, soil, or water either inside the plant boundaries or in the plant environs. In all cases, values measured were only small fractions of the recommended maximum permissible concentrations.

With respect to air-borne contamination, monitoring of the general air well within plant boundaries (averaging about 225 eight-hour samples per quarter) revealed no indication of activities approaching the permissible limits (general population) within these boundaries for even short periods. Thus, it appears essentially impossible that any significant air contamination problems can occur outside the ORGDP area.

Plant wastes released into public waterways are monitored at least weekly to insure that the concentration of these materials in the streams leaving the plant boundaries does not exceed the permissible limits given in NBS Handbook No. 69 for drinking water of the general population. Monitoring points in Poplar Creek and Clinch River are both upstream and downstream from ORGDP. There were no instances of water release at the plant boundaries above the long-term maximum permissible concentration even for as short a time as the weekly sampling period, and the average activity in Poplar Creek below the plant for the quarter continues to represent only 0.02% of the maximum permissible concentration for the discharge of natural uranium; the levels in the Clinch River were much less than this figure.

Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant

April 18, 1960

April 18, 1960

ENVIRONMENTAL SAMPLING
OAK RIDGE GASEOUS DIFFUSION PLANT

Period January - March, 1960

| Location of Point | Type of Analysis Made | No. of Samples | Concentration ($\mu\text{c}/\text{cc} \times 10^{-8}$) | | | | Av. Pl. Exp./MPC |
|------------------------------|-----------------------|----------------|--|------|------------------------|------|------------------|
| | | | Plant Experience | | Max. Permissible (MPC) | | |
| | | | Low | High | | Av. | |
| <u>Local Streams (Water)</u> | | | | | | | |
| <u>Poplar Creek</u> | Uranium Concentration | | | | | | |
| Upstream | | 13 | 1.6 | 7.0 | 4.4 | 2000 | 0.22% |
| Downstream | " | 13 | 0.2 | 1.0 | 0.5 | 2000 | 0.02% |
| <u>Clinch River</u> | | | | | | | |
| Upstream | " | 13 | 0 | 0.3 | 0.1 | 2000 | 0.005% |
| Downstream | " | 13 | 0.07 | 0.5 | 0.2 | 2000 | 0.010% |

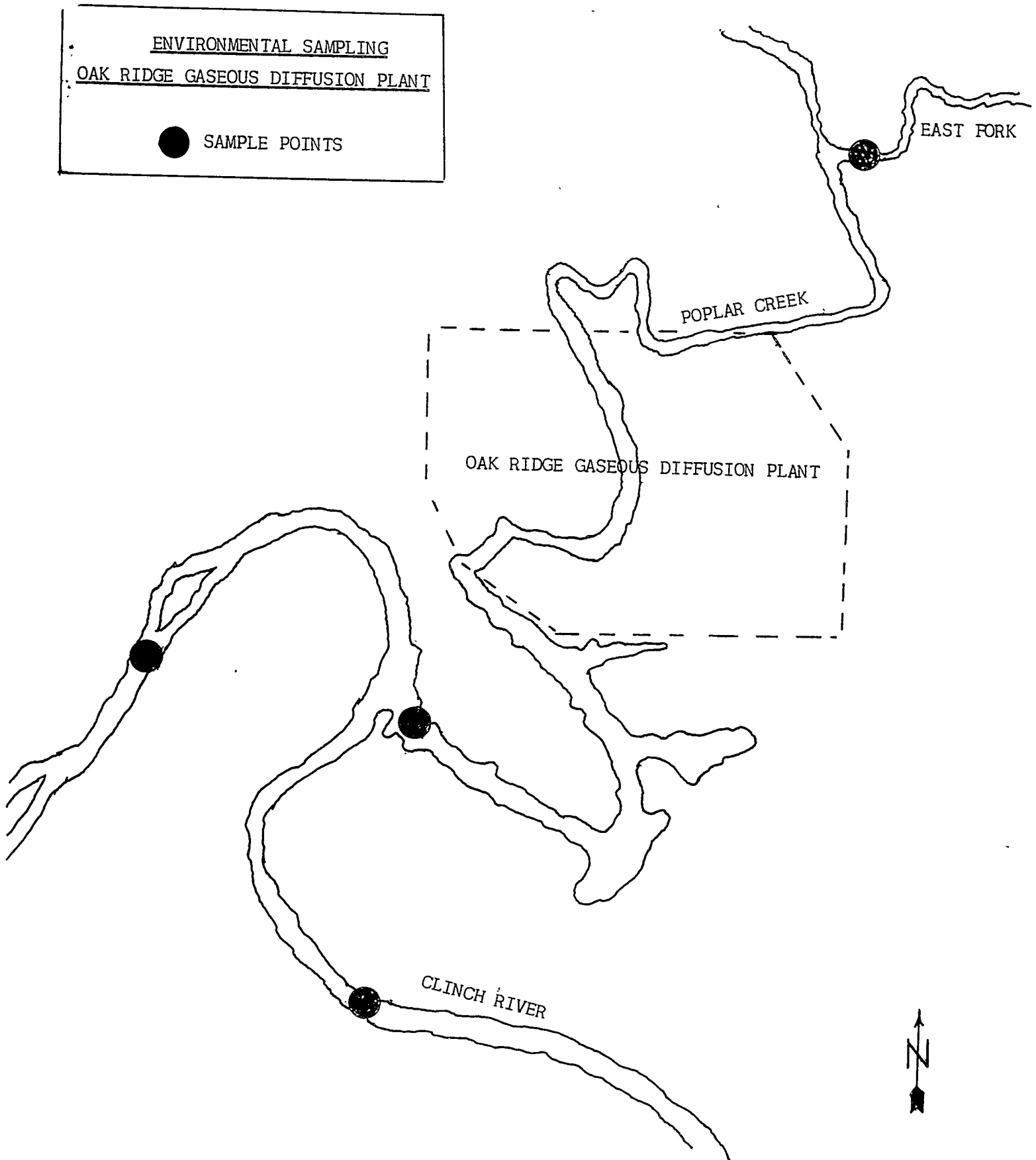
| | | | | | | |
|---------------------|------------------------|----|------|-------|-------|------|
| <u>Poplar Creek</u> | Total Beta Activity | | | | | |
| Upstream | | 13 | 7.7 | 226.4 | 35.6 | 2000 |
| Downstream | " | 13 | 27.9 | 129.2 | 74.7 | 2000 |
| <u>Clinch River</u> | | | | | | |
| Upstream | " | 13 | 97.7 | 287.1 | 171.0 | 310* |
| Downstream | " | 13 | 32.0 | 380.7 | 139.1 | 310* |

Normal Sampling Frequency: Continuous sampling; composited over one week.

* Measured mixture of radionuclides.

1.8%
3.5%
55.0%
45.0%

April 18, 1960



May 28, 1960

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

Report for 1959

Data Compiled by: H. H. Abee

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to earthen pits located in the Conasauga shale formation. Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

Air Monitoring

Atmospheric contamination and fall-out occurring in the general environment of East Tennessee are monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge operations on the immediate environment. A second system consists of eight stations encircling the Oak Ridge area at distances of from 12 to 120 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur.

Three types of samples are collected at the stations. One type is taken by passing air continuously through filter paper. The filter paper will collect only those particulates considered to be respirable. A second type utilizes a gummed paper technique for collecting fall-out. The fall-out trays collect the heavier particles as well as the respirable particles. A third type is rain water which provides data for determining the soluble and insoluble fractions of the radioactive contamination.

Data obtained from the various sampling methods are accumulated and tabulated. In the case of the filter samples, data are tabulated in average $\mu\text{c/cc}$ of air sampled and numbers of particles per 1000 ft^3 of air sampled. In the case of gummed paper fall-out collection, data are tabulated in $\mu\text{c/ft}^2$ and numbers of particles per ft^2 . In the case of rain water, data are tabulated in average $\mu\text{c/cc}$ of rainfall collected. The data are compared to established maximum permissible concentrations and with previous averages.

Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for population in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

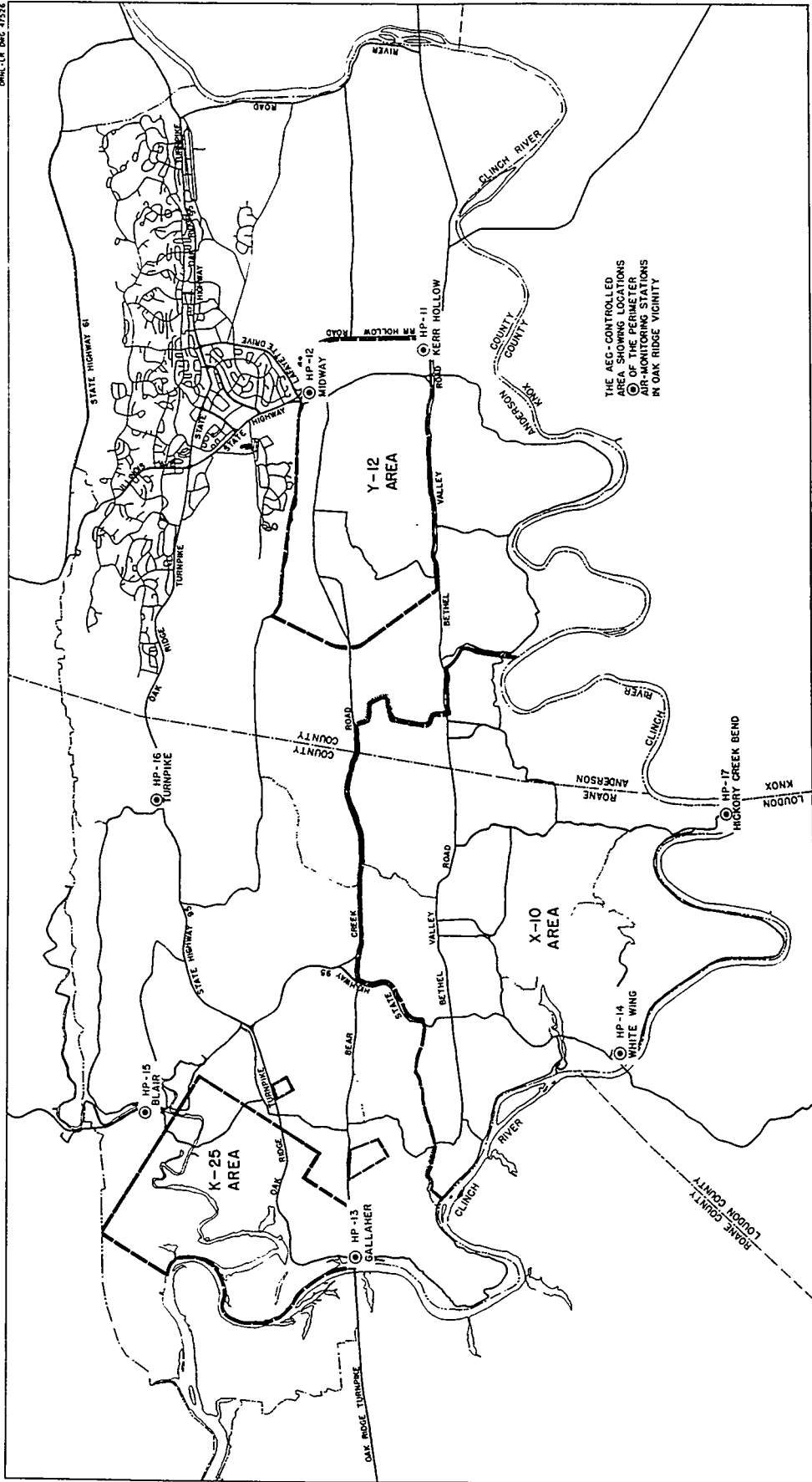
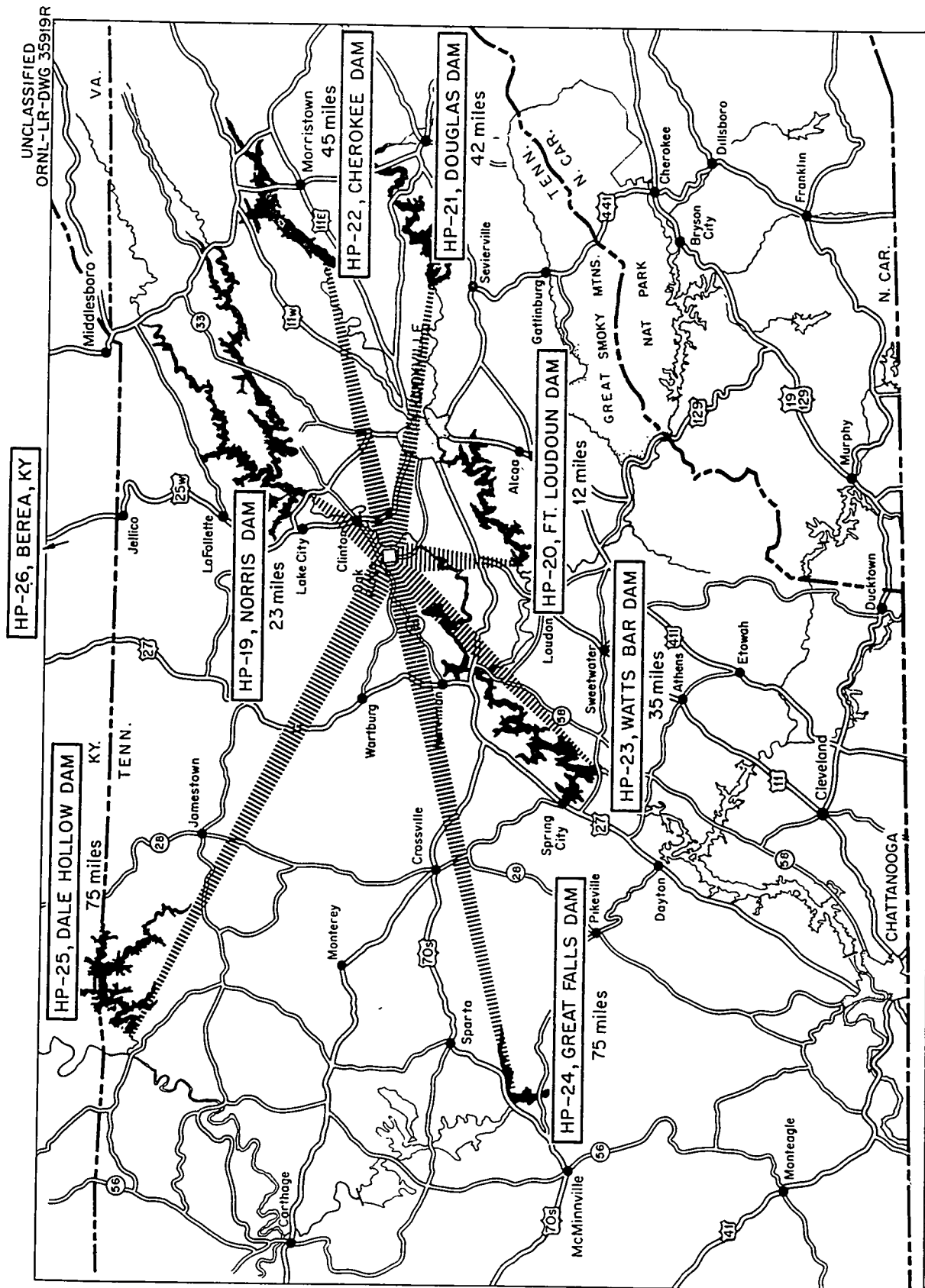


Figure 1



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 3 and 4. Samples are taken in Poplar Creek and White Oak Creek prior to entry of the wastes into the public waterway and at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

The fraction of the total beta activity comprised by each isotope is determined from analysis of long-lived radionuclides contained in the effluent and a weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of radioactivity in the Clinch River are compared to the calculated $(MPC)_w$ value.

Annual surveys of the Clinch and Tennessee Rivers are conducted to determine the extent of dispersion of radioactive material in river sediment. This survey is required in order to determine whether or not there is a significant build-up of radioactive constituents in the river system. Gamma radiation measurements are made on the bottom sediments. Sediment samples are radiochemically analyzed for long-lived radioactive isotopes.

Gamma Measurements

External gamma radiation levels are measured monthly at five locations in the Oak Ridge area. Measurements are taken with a Geiger-Muller tube at a distance of three feet above ground and the results are tabulated in terms of mr/hr.

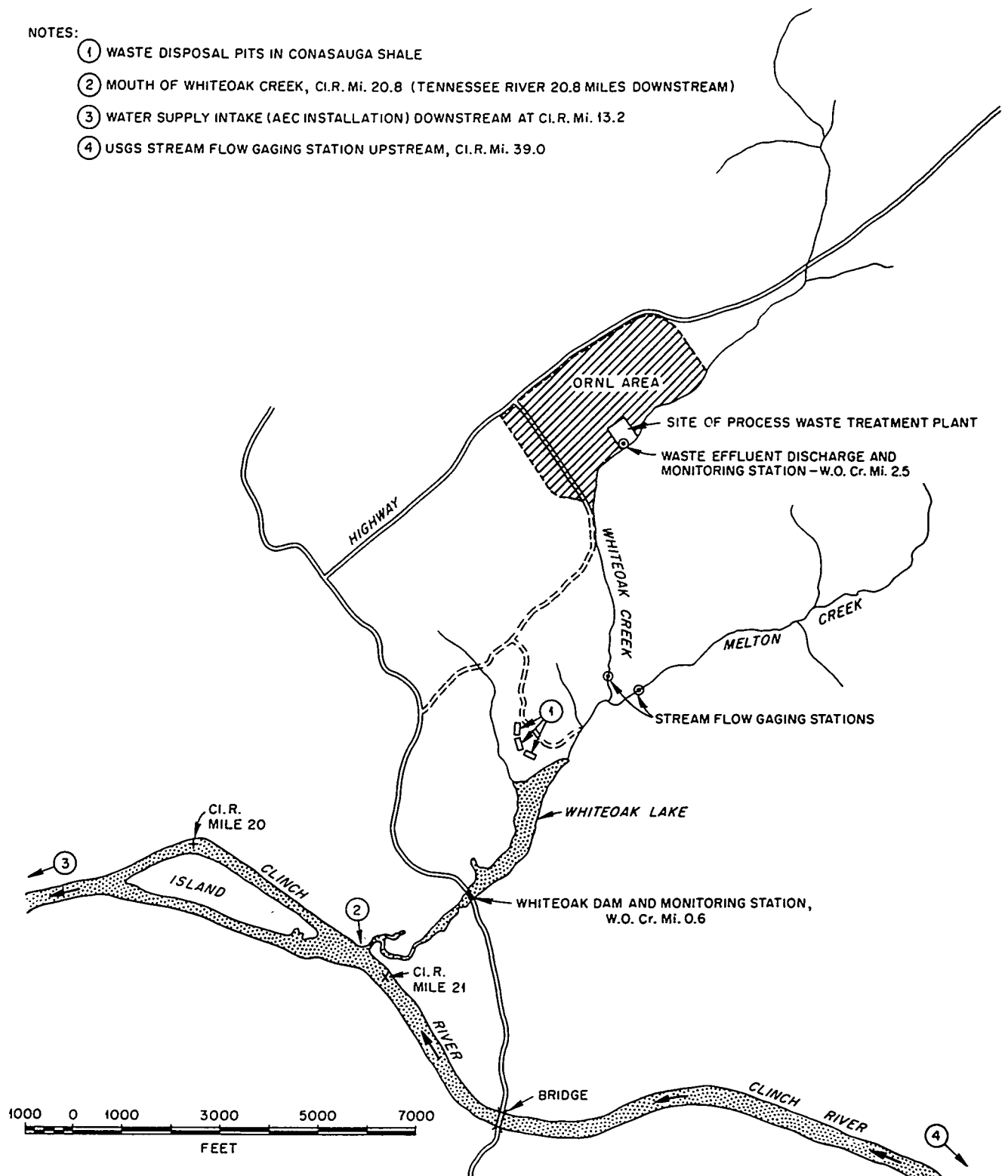
Discussion of Data

Data accrued from the monitoring system in 1959 are presented in Tables I through X.

The air contamination levels shown by the continuous air monitoring systems for the immediate and remote environs of the Oak Ridge area were 1.6% and 1.4% respectively of the maximum permissible concentration for populations in the neighborhood of a controlled area. Air contamination levels during the first half of 1959 were a factor of 4 to 6 times greater than the average for the entire year. By the end of 1959 air contamination levels had decreased to approximately 1/5 the value given for the yearly

NOTES:

- ① WASTE DISPOSAL PITS IN CONASAUGA SHALE
- ② MOUTH OF WHITEOAK CREEK, Cl.R. Mi. 20.8 (TENNESSEE RIVER 20.8 MILES DOWNSTREAM)
- ③ WATER SUPPLY INTAKE (AEC INSTALLATION) DOWNSTREAM AT Cl.R. Mi. 13.2
- ④ USGS STREAM FLOW GAGING STATION UPSTREAM, Cl.R. Mi. 39.0



Location Sketch Map
ORNL Area Surface Drainage

Figure 3

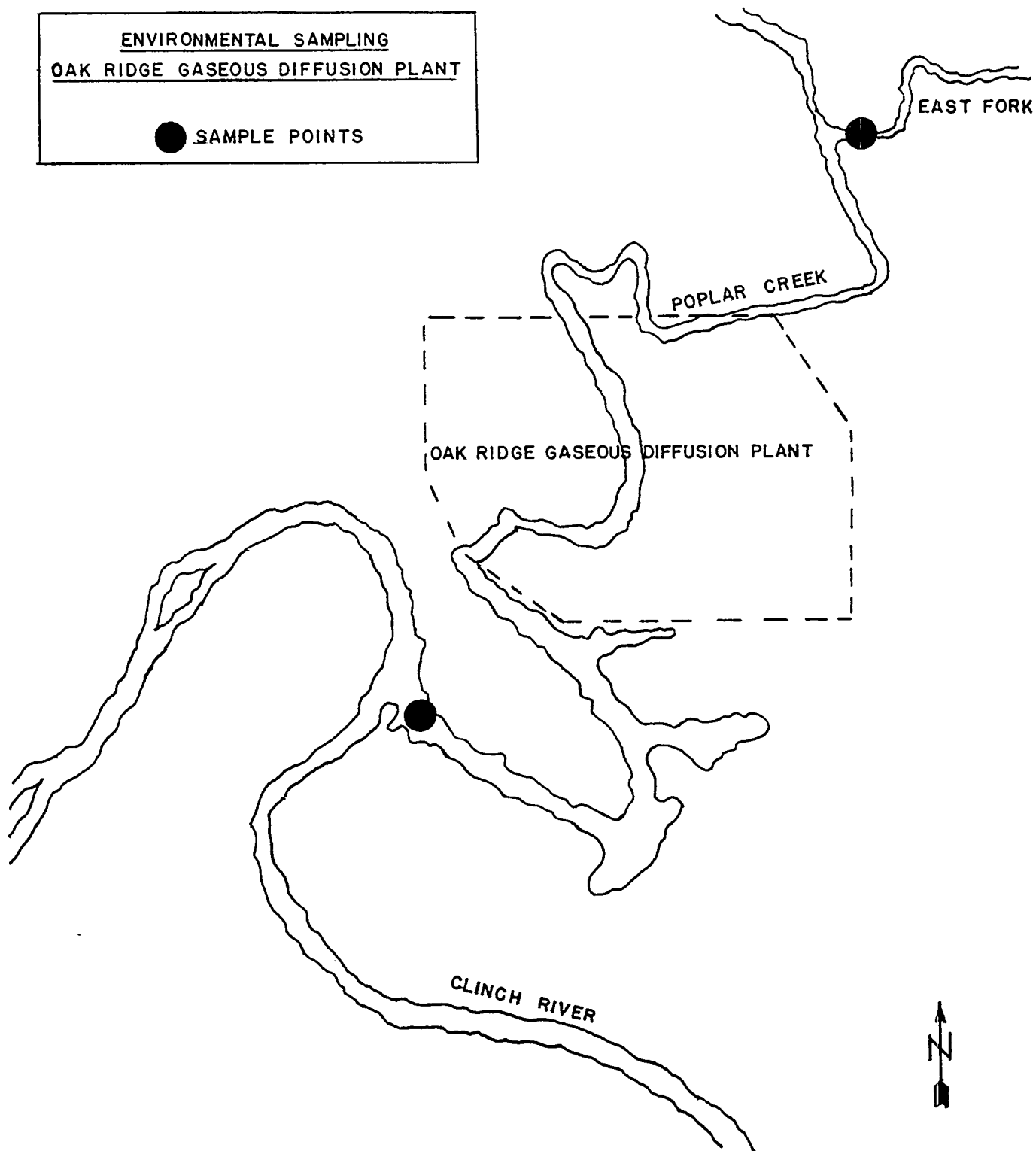


Figure 4

average. Specific analysis for fission products and decay studies indicated that the high levels experienced during the first part of the year were due to the type of fall-out from world-wide weapons testing. The low values for remote stations 23 and 24 resulted from the fact that these stations were in operation only during the latter half of 1959 and do not reflect the higher fall-out levels experienced during the first half of the year.

Fall-out data and rain water data followed the same trend shown by the continuous air monitoring data.

The probable average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of the wastes, and at Mile 4.5, near Kingston, Tennessee, were 3.1×10^{-7} $\mu\text{c/cc}$ and 4.9×10^{-8} $\mu\text{c/cc}$ respectively. These values are 25.4% and 22.3% of the weighted average maximum permissible concentration for populations in the neighborhood of a controlled area as recommended by the NCRP. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 3×10^{-10} $\mu\text{c/cc}$, which is 0.03% of the weighted average (MPC)_w value. The average activity in Poplar Creek below the ORGDP for the entire year was only 0.03% of the maximum permissible concentration for natural uranium.

The concentration of radioactivity in the sediment of the Clinch River drops off materially after the first 20 miles downstream from the entry of White Oak Creek and approaches background levels 200 miles downstream. The average radiation level for the cross section where the highest levels were encountered was approximately 19 times the measured background levels or 0.12 mr/hr. This point is located 4.5 miles below the outfall of White Oak Creek. At 100 miles downstream the average level was approximately twice background.

External gamma radiation levels in the Oak Ridge area averaged 0.024 mr/hr. This level does not differ significantly from the average of the levels measured throughout the United States by the U. S. Public Health Service Radiation Surveillance Network.

TABLE I

CONTINUOUS AIR MONITORING FILTER DATA

Units of 10^{-13} $\mu\text{c}/\text{cc}$ 1959

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average | % of (MPC) _a * |
|--------------------|--------------------|-------------------------|---------|---------|---------|---------------------------|
| Perimeter Stations | | | | | | |
| HP-11 | Kerr Hollow Gate | 52 | 47.52 | 0.49 | 15.77 | 1.6 |
| HP-12 | Midway Gate | 49 | 81.31 | 0.08 | 16.29 | 1.6 |
| HP-13 | Gallaher Gate | 52 | 58.52 | 0.54 | 16.63 | 1.7 |
| HP-14 | White Wing Gate | 52 | 42.48 | 0.49 | 11.30 | 1.1 |
| HP-15 | Blair Gate | 52 | 61.06 | 0.45 | 19.97 | 2.0 |
| HP-16 | Turnpike Gate | 52 | 51.61 | 0.28 | 13.48 | 1.4 |
| HP-17 | Hickory Creek Bend | 52 | 60.27 | 0.17 | 16.86 | 1.7 |
| Average | | | | | 15.76 | 1.6 |
| Remote Stations | | | | | | |
| HP-19 | Norris Dam | 52 | 86.20 | 0.57 | 23.23 | 2.3 |
| HP-20 | Loudoun Dam | 52 | 90.49 | 0.65 | 22.11 | 2.2 |
| HP-21 | Douglas Dam | 37 | 58.17 | 0.68 | 10.91 | 1.1 |
| HP-22 | Cherokee Dam | 39 | 100.52 | 0.52 | 16.01 | 1.6 |
| HP-23** | Watts Bar Dam | 29 | 35.14 | 0.49 | 5.13 | 0.5 |
| HP-24** | Great Falls Dam | 26 | 10.58 | 0.24 | 2.53 | 0.3 |
| HP-25 | Dale Hollow Dam | 46 | 78.91 | 0.76 | 18.04 | 1.8 |
| HP-26 | Berea, Kentucky | 52 | 54.27 | 0.14 | 13.77 | 1.4 |
| Average | | | | | 13.97 | 1.4 |

* (MPC)_a is taken to be 10^{-10} $\mu\text{c}/\text{cc}$ as recommended in NBS Handbook 69, Table 4, p. 94.
 ** Stations in operation only during latter half of 1959.

TABLE II

CONTINUOUS AIR MONITORING FILTER DATA

Particles/1000 cu. ft. of Air Sampled

1959

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average |
|--|--------------------|-------------------------|---------|---------|---------|
| Perimeter Stations | | | | | |
| HP-11 | Kerr Hollow Gate | 52 | 6.27 | 0.00 | 1.20 |
| HP-12 | Midway Gate | 49 | 6.81 | 0.00 | 1.29 |
| HP-13 | Gallaher Gate | 52 | 5.08 | 0.00 | 0.95 |
| HP-14 | White Wing Gate | 52 | 5.91 | 0.00 | 0.82 |
| HP-15 | Blair Gate | 52 | 10.29 | 0.00 | 1.52 |
| HP-16 | Turnpike Gate | 52 | 5.39 | 0.00 | 0.86 |
| HP-17 | Hickory Creek Bend | 52 | 7.22 | 0.00 | 1.02 |
| Average | | | | | 1.09 |
| Remote Stations | | | | | |
| HP-19 | Norris Dam | 52 | 7.98 | 0.00 | 1.64 |
| HP-20 | Loudoun Dam | 52 | 6.61 | 0.00 | 1.43 |
| HP-21 | Douglas Dam | 37 | 2.83 | 0.00 | 0.28 |
| HP-22 | Cherokee Dam | 39 | 7.26 | 0.00 | 0.54 |
| HP-23* | Watts Bar Dam | 29 | 0.40 | 0.00 | 0.05 |
| HP-24* | Great Falls Dam | 26 | 0.14 | 0.00 | 0.02 |
| HP-25 | Dale Hollow Dam | 46 | 7.96 | 0.00 | 1.01 |
| HP-26 | Berea, Kentucky | 52 | 5.83 | 0.00 | 1.10 |
| Average | | | | | 0.76 |
| * Stations in operation only during latter half of 1959. | | | | | |

TABLE III

GUMMED PAPER FALL-OUT DATA

Units of 10^{-4} $\mu\text{c}/\text{sq. ft.}$ 1959

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average |
|--------------------|--------------------|-------------------------|---------|---------|---------|
| Perimeter Stations | | | | | |
| HP-11 | Kerr Hollow Gate | 52 | 17.59 | 0.14 | 5.01 |
| HP-12 | Midway Gate | 52 | 18.64 | 0.23 | 5.01 |
| HP-13 | Gallaher Gate | 52 | 17.15 | 0.18 | 4.63 |
| HP-14 | White Wing Gate | 52 | 16.87 | 0.18 | 4.86 |
| HP-15 | Blair Gate | 52 | 23.55 | 0.15 | 5.37 |
| HP-16 | Turnpike Gate | 52 | 28.88 | 0.15 | 5.03 |
| HP-17 | Hickory Creek Bend | 52 | 15.17 | 0.14 | 4.41 |
| Average | | | | | 4.90 |
| Remote Stations | | | | | |
| HP-19 | Norris Dam | 52 | 23.53 | 0.12 | 4.36 |
| HP-20 | Loudoun Dam | 51 | 14.97 | 0.05 | 4.17 |
| HP-21 | Douglas Dam | 37 | 15.20 | 0.04 | 1.99 |
| HP-22 | Cherokee Dam | 39 | 13.45 | 0.07 | 2.51 |
| HP-23* | Watts Bar Dam | 28 | 4.55 | 0.10 | 0.71 |
| HP-24* | Great Falls Dam | 26 | 2.75 | 0.12 | 0.63 |
| HP-25 | Dale Hollow Dam | 46 | 20.75 | 0.14 | 4.26 |
| HP-26 | Berea, Kentucky | 52 | 22.02 | 0.05 | 4.88 |
| Average | | | | | 2.94 |

* Stations in operation only during latter half of 1959.

TABLE IV

GUMMED PAPER FALL-OUT DATA

Particles/sq. ft.

1959

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average |
|--------------------|--------------------|-------------------------|---------|---------|---------|
| Perimeter Stations | | | | | |
| HP-11 | Kerr Hollow Gate | 52 | 77.00 | 0.00 | 11.96 |
| HP-12 | Midway Gate | 52 | 97.00 | 0.00 | 12.85 |
| HP-13 | Gallaher Gate | 52 | 84.00 | 0.00 | 10.50 |
| HP-14 | White Wing Gate | 52 | 82.00 | 0.00 | 10.13 |
| HP-15 | Blair Gate | 52 | 97.00 | 0.00 | 12.15 |
| HP-16 | Turnpike Gate | 52 | 76.00 | 0.00 | 9.50 |
| HP-17 | Hickory Creek Bend | 52 | 59.00 | 0.00 | 9.50 |
| Average | | | | | 10.94 |
| Remote Stations | | | | | |
| HP-19 | Norris Dam | 52 | 47.00 | 0.00 | 6.23 |
| HP-20 | Loudoun Dam | 31 | 46.00 | 0.00 | 5.27 |
| HP-21 | Douglas Dam | 37 | 14.00 | 0.00 | 0.51 |
| HP-22 | Cherokee Dam | 39 | 11.00 | 0.00 | 0.90 |
| HP-23* | Watts Bar Dam | 28 | 3.00 | 0.00 | 0.41 |
| HP-24* | Great Falls Dam | 26 | 3.00 | 0.00 | 0.19 |
| HP-25 | Dale Hollow Dam | 46 | 59.00 | 0.00 | 4.54 |
| HP-26 | Berea, Kentucky | 52 | 63.00 | 0.00 | 7.19 |
| Average | | | | | 3.16 |

* Stations in operation only during latter half of 1959.

TABLE V

RADIOACTIVITY IN RAIN WATER

Units of 10^{-7} $\mu\text{c/cc}$ 1959

| Station Number | Location | Number of Samples Taken | Maximum | Minimum | Average |
|--|--------------------|-------------------------|---------|---------|---------|
| Perimeter Stations | | | | | |
| HP-11 | Kerr Hollow Gate | 44 | 42.59 | 0.11 | 7.22 |
| HP-12 | Midway Gate | 44 | 40.38 | 0.14 | 6.30 |
| HP-13 | Gallaher Gate | 44 | 38.72 | 0.12 | 6.10 |
| HP-14 | White Wing Gate | 43 | 43.47 | 0.09 | 6.53 |
| HP-15 | Blair Gate | 39 | 39.36 | 0.19 | 5.78 |
| HP-16 | Turnpike Gate | 44 | 54.84 | 0.15 | 8.82 |
| HP-17 | Hickory Creek Bend | 43 | 54.18 | 0.10 | 8.14 |
| Average | | | | | 6.98 |
| Remote Stations | | | | | |
| HP-19 | Norris Dam | 45 | 89.98 | 0.13 | 11.26 |
| HP-20 | Loudoun Dam | 49 | 138.47 | 0.04 | 14.65 |
| HP-21 | Douglas Dam | 31 | 36.68 | 0.06 | 3.86 |
| HP-22 | Cherokee Dam | 33 | 32.20 | 0.13 | 4.41 |
| HP-23* | Watts Bar Dam | 23 | 6.89 | 0.20 | 1.32 |
| HP-24* | Great Falls Dam | 21 | 8.22 | 0.07 | 1.41 |
| HP-25 | Dale Hollow Dam | 41 | 41.00 | 0.21 | 8.02 |
| HP-26 | Berea, Kentucky | 44 | 47.28 | 0.14 | 10.14 |
| Average | | | | | 6.88 |
| * Stations in operation only during latter half of 1959. | | | | | |

TABLE VI

PROBABLE AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

Units of 10^{-7} $\mu\text{c/cc}$

1959

| Number of Samples Taken | Maximum | Minimum | Average | % of (MPC) _w |
|----------------------------|---------|---------|---------|-------------------------|
| 365 | 36.4 | 0.37 | 3.1 | 25.4 |

TABLE VII

AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER1959

| Location | Sampling Period | Units of 10^{-8} $\mu\text{c/cc}$ | | | | Co^{60} | Probable Avg. Concn. of Radioactivity $\mu\text{c/cc} \times 10^{-8}$ | | $(\text{MPC})_w^{a}$ 10^{-6} $\mu\text{c/cc}$ | % of MPC |
|-----------------------|---------------------|-------------------------------------|-------------------|-------------------|-----------------------|------------------|---|-------------------------------|---|----------|
| | | Sr^{90} | Ce^{144} | Cs^{137} | $\text{Ru}^{103-106}$ | | Radioactivity | 10^{-6} $\mu\text{c/cc}$ | | |
| Clinch River | | | | | | | | | | |
| Mi. 37.5 | 10/1/59 - 1/29/60 | 0.11 | 0.10 | * | * | * | 0.45 | 0.21 | 2.14 | |
| Mi. 20.8 ^b | 12/28/58 - 12/27/59 | 2.00 | 1.5 | 1.9 | 7.4 | 1.8 | 31.0 | 1.22 | 25.4 | |
| Mi. 4.5 | 10/23/58 - 11/3/59 | 1.86 | 0.54 | 0.53 | 1.14 | 0.23 | 4.9 | 0.22 | 22.3 | |

^a Weighted average $(\text{MPC})_w$ calculated for the mixture using $(\text{MPC})_w$ values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on the levels of waste released and the dilution afforded by the river.

* None detected.

TABLE VIII

EXTERNAL GAMMA RADIATION LEVELS

mr/hr

1959

| Station Number | Location | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Avg. |
|----------------|------------------------|------|------|------|------|------|------|------|------|-------|------|------|------------|------|
| 1 | Solway Gate | .022 | .026 | .028 | .027 | .033 | .028 | .025 | .019 | .020 | .015 | .016 | none taken | .024 |
| 2 | Y-12 East Portal | .016 | .021 | .024 | .020 | .026 | .017 | .022 | .015 | .019 | .014 | .013 | " | .019 |
| 3 | Newcomb Road Oak Ridge | .018 | .020 | .025 | .023 | .026 | .024 | .023 | .015 | .022 | .016 | " | " | .021 |
| 4 | Gallaher Gate | .025 | .025 | .030 | .030 | .032 | .034 | .025 | .021 | .025 | .022 | " | " | .027 |
| 5 | White Wing Gate | .031 | .028 | .022 | .032 | .029 | .035 | .036 | .018 | .025 | .019 | .019 | " | .027 |
| Average | | | | | | | | | | | | | | .024 |

TABLE IX

CONCENTRATION OF RADIOACTIVITY IN POPLAR CREEK

1959

| Location of Point | Type of Analysis Made | No. of Samples | Units of 10^{-8} $\mu\text{c/cc}$ | | | Percent (MPC) _w |
|----------------------|-----------------------|----------------|-------------------------------------|---------|---------|----------------------------|
| | | | Maximum | Minimum | Average | |
| Upstream (East Fork) | Uranium Concentration | 52 | 8.7 | 3.7 | 6.2 | 0.31 |
| Downstream (Outfall) | " | 52 | 1.0 | 0.5 | 0.6 | 0.03 |
| Upstream (East Fork) | Total Beta Activity | 52 | 22.0 | 14.0 | 18.0 | 0.9 |
| Downstream (Outfall) | " | 52 | 32.0 | 11.0 | 22.0 | 1.1 |

Normal Sampling Frequency: Continuous sampling; composited over one week.

TABLE X

RADIOACTIVITY IN THE BOTTOM SEDIMENT OF POPLAR CREEK

Units of 10^{-8} $\mu\text{c/g}$ 1959

| Location of Point | Type of Analysis Made | No. of Samples | Maximum | Minimum | Average |
|----------------------|-----------------------|----------------|---------|---------|---------|
| Upstream (East Fork) | Uranium Concentration | 4 | 6900 | 400 | 3200 |
| Downstream (Outfall) | " | 4 | 4500 | 1300 | 2500 |
| Upstream (East Fork) | Total Beta Activity | 4 | 28,600 | 7200 | 18,000 |
| Downstream (Outfall) | " | 4 | 21,200 | 12,900 | 18,500 |

Normal Sampling Frequency: Grab sample, once each quarter at each location.

UNION
CARBIDE

INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY • POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name) Mr. J. C. Hart
Company
Location ORNL

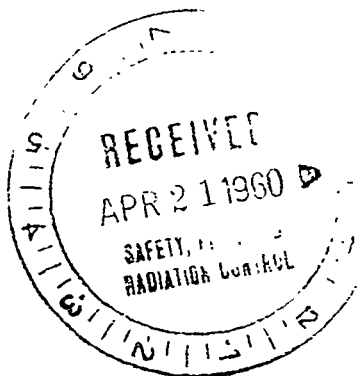
Date April 12, 1960

Originating Dept.

Answering letter date


Copy to Mr. L. B. Emler

Subject News Release on Environmental
Surveys



Attached are copies of the subject information for all of 1959 and the first quarter of 1960 for inclusion in the over-all report to the Commission. The tables include the data specified in the letter March 21 from S. R. Sapir to C. E. Center. In addition, a cover evaluation sheet for each period is included as is a map showing the sampling points. We have not presented any data concerning the beta activity in our potable water supply since you will probably wish to include this as a part of your own environmental survey report; I understand our data have been made available to you.

Please advise if additional information is needed.


A. P. Huber, Plant Superintendent
Oak Ridge Gaseous Diffusion Plant

✓
MFH:shh

Attachment
Environmental Radioactivity Levels,
The Oak Ridge Gaseous Diffusion Plant

No RL

For Immediate News Release

ENVIRONMENTAL RADIOACTIVITY LEVELS
THE OAK RIDGE GASEOUS DIFFUSION PLANT
1959

The results of environmental sampling by the ORGDP during 1959 indicate little, if any, radioactive material contamination of air, soil, or water either inside the plant boundaries or in the plant environs. In all cases, values measured were only small fractions of the recommended maximum permissible concentrations.

With respect to air-borne contamination, monitoring of the general air well within plant boundaries (averaging about 225 eight-hour samples per quarter) revealed no indication of activities approaching the permissible limits (general population) within these boundaries for even short periods. Thus, it appears essentially impossible that any significant air contamination problems can occur outside the ORGDP area.

Plant wastes released into public waterways are monitored at least weekly to insure that the concentration of these materials in the streams leaving the plant boundaries does not exceed the permissible limits given in NBS Handbook No. 69 for drinking water of the general population. Monitoring points in Poplar Creek and Clinch River are both upstream and downstream from ORGDP. There were no instances of water release at the plant boundaries above the long-term maximum permissible concentration even for as short a time as the weekly sampling period, and the average activity in Poplar Creek below the plant for the entire year was only 0.03% of the maximum permissible concentration for the discharge of natural uranium; the levels in the Clinch River were much less than this figure.

Industrial Relations Division
Oak Ridge Gaseous Diffusion Plant

April 18, 1960

April 18, 1960

ENVIRONMENTAL SAMPLING
OAK RIDGE GASEOUS DIFFUSION PLANT

Period 1959

| Location of Point | Type of Analysis Made | No. of Samples | Concentration ($\mu\text{c/cc} \times 10^{-8}$) | | | | Av. Pl. Exp./MPC |
|------------------------------|-----------------------|----------------|---|-------|------------------------|------|------------------|
| | | | Plant Experience | | Max. Permissible (MPC) | | |
| | | | Low | High | | | |
| <u>Local Streams (Water)</u> | | | | | | | |
| <u>Poplar Creek</u> | Uranium Concentration | | | | | | |
| Upstream | | 52 | 3.7 | 8.7 | 6.2 | 2000 | 0.31% |
| Downstream | " | 52 | 0.5 | 1.0 | 0.6 | 2000 | 0.03% |
| <u>Clinch River</u> | | | | | | | |
| Upstream | " | 52 | 0.08 | 0.2 | 0.1 | 2000 | 0.005% |
| Downstream | " | 52 | 0.1 | 0.3 | 0.3 | 2000 | 0.015% |
| <u>Poplar Creek</u> | Total Beta Activity | | | | | | |
| Upstream | | 52 | 14.0 | 22.0 | 18.0 | 2000 | 0.9% |
| Downstream | " | 52 | 11.0 | 32.0 | 22.0 | 2000 | 1.1% |
| <u>Clinch River</u> | | | | | | | |
| Upstream | " | 52 | 13.0 | 96.0 | 39.0 | 105* | 37% |
| Downstream | " | 52 | 10.0 | 136.0 | 50.0 | 105* | 48% |

Normal Sampling Frequency: Continuous sampling; composited over one week.

* Measured mixture of radionuclides.

ENVIRONMENTAL SAMPLING
OAK RIDGE GASEOUS DIFFUSION PLANT

Period 1959

| <u>Location of Point</u> | <u>Type of Analysis Made</u> | <u>No. of Samples</u> | <u>Concentration ($\mu\text{c/g} \times 10^{-8}$)</u> | | | <u>Max. Permissible (MPC)</u> |
|----------------------------|------------------------------|-----------------------|--|-------------|------------|-------------------------------|
| | | | <u>Plant Experience</u> | | <u>Av.</u> | |
| | | | <u>Low</u> | <u>High</u> | | |
| <u>Stream Bottom (Mud)</u> | | | | | | |
| <u>Poplar Creek</u> | Uranium Con- | | | | | |
| Upstream | centration | 4 | 400 | 6900 | 3200 | None Specified |
| Downstream | " | 4 | 1300 | 4500 | 2500 | |
| <u>Clinch River</u> | | | | | | |
| Downstream | " | 4 | 300 | 1300 | 700 | |
| <u>Poplar Creek</u> | Total Beta | | | | | |
| Upstream | Activity | 4 | 7200 | 28,600 | 18,000 | None Specified |
| Downstream | " | 4 | 12,900 | 21,200 | 18,500 | |
| <u>Clinch River</u> | | | | | | |
| Downstream | " | 4 | 15,800 | 79,200 | 45,500 | |

Normal Sampling Frequency: Grab sample, once each quarter at each location.

MEMO TO: Files

SUBJECT: Meeting to Discuss Release of Environmental Information to the Press - February 14, 1961

Those Present: H. V. Haecker and J. A. Lenhard - AEC; H. H. Abee, D. M. Davis, E. D. Gupton, and J. C. Hart - ORNL; A. F. Becher and H. F. Henry - ORGDP

A meeting was held at ORNL on February 14, 1961, to review the Company's responsibility for reporting of the subject data to the AEC.

AEC - J. A. Lenhard

1. Initially, Headquarters was not sure of what to include or what format to follow. Following discussion at Germantown (H. H. Abee, UCNC representative) with contractors, the general scope of coverage was agreed upon.
2. After "polishing" the initial issues, the format was fixed and the following guide lines were established:
 - a. No monitoring results to be included for which standards or limits have not been established, e.g., ORGDP mud results, ORNL "rain out" samples.
 - b. ORGDP river water results showing gross beta activity to be deleted, (per J. A. Lenhard), due to possible misunderstanding of differences between their results and ORNL's.
 - c. Additions to the fixed report must be cleared with Mr. C. A. Keller, ORO, and deletions therefrom with headquarters.
3. Indicates he was aware of deletion of Clinch River, ORGDP data, as well as air results but wasn't sure why this was done. Suggests we ought to include ORGDP uranium values in Clinch River and in air.
4. Re-emphasized no samples to be included except those for which standards or MPC's were established.

ORNL - et al.

1. Did not include Clinch River gross beta from ORGDP based on agreement reached by them with Mr. J. A. Lenhard (possible misinterpretation, etc.).
2. For the same reason, he felt that quoting uranium values in Clinch River might be misunderstood, although he readily admitted that the MPC's were quite different and specifically given.
3. Similarly, he felt that there may be some confusion resulting from quoting our uranium alpha results in air vs. their gross beta for fission products. This was given rather weakly, and it was rather obvious that he felt that the only official data to be included was ORNL's plus the ORGDP's for Poplar Creek which they couldn't obtain.

ORGDP

1. Question was raised to the AEC with regard to basis for original instruction which indicated:
 - a. Results to be made available to the public to reflect the impact of the individual installation or plant on its environs.
 - b. Comparisons to be made with MPC's or if not available with background values, previous results, etc., which might reflect trends, etc.
 - c. If values other than those used as standards, i.e., $\mu\text{c/cc}$, $\mu\text{c/ml}$, etc., are used, they must be interpreted in terms which are meaningful to the layman.
 - d. AEC regulations prescribe the formal and immediate reporting to the ORO on cases where a member of the general public may have been exposed to significant quantities of radioactive materials, etc.

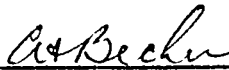
Following a lengthy discussion of individual interpretations of the instructions, it was agreed that:

AEC - J. A. Lenhard, will arrange for transmittal of a letter to UCNC reiterating their request for sampling data and specifically amending it as may be necessary to reflect what changes in the present format are desired as well as to the inclusion or exclusion of specific data presently being withheld.

AFB:la

March 1, 1961

NoRC


A. F. Becher
Safety and Health Physics

MEETING TO DISCUSS RELEASE OF ENVIRONMENTAL
INFORMATION TO THE PUBLIC

February 14, 1961

Those Present: H. V. Haecker and J. A. Lenhard - AEC; H. H. Abee,
D. M. Davis, E. D. Gupton, and J. C. Hart - ORNL;
A. F. Becher and H. F. Henry - ORGDP

The meeting involved discussion of information which should be presented to the Commission for public release. Mr. Lenhard made the following comments concerning the reports, stating that these were decisions which had been made by the Commission:

1. No data will be reported unless they can be directly compared with a listed "standard" such as a maximum permissible concentration or maximum permissible limit; this refers particularly to the units in which data are reported.
2. The present format of the report has been approved at the Washington AEC, and any changes in the format, as well as any additions, would necessarily require the same type of approval; however, deletions may be approved locally.
3. Since it is desirable that all information presented will be meaningful to the layman, sources of apparent discrepancies which might be confusing are omitted. Hence, the ORGDP data on beta activity in the Clinch River has been eliminated in favor of the figures given by ORNL.
4. Nothing on fallout, especially as it might be related by the newspapers to any bomb tests, or other matters not directly affecting the possibility of personnel exposure from plant activities should be included.

The ORGDP representatives pointed out that the criteria for information to be reported to the public as given in a letter of August 24, 1960, from Mr. Sapirie to Mr. Center, specifically mentioned a comparison of measured data to such items as background or preceding environmental studies and that other written Commission directives had indicated the need for obtaining the necessary information to show the impact of the plant activities upon the environment. In addition, it would appear that information of the type the ORGDP has been obtaining, including analyses of the mud, vegetation, and soil, is necessary to meet the general objective of the Commission's directive; thus, in the absence of written authorization to the contrary, a contractor would be required to obtain and report such data.

Mr. Abee noted that the ORGDP air data had not been included because the MPC figures given differed from those of ORNL. It was pointed out that

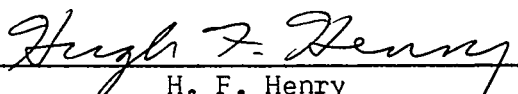
the ORNL figures were for beta-gamma fission products while the ORGDP figures were for uranium, so the MPCs should be different. It was also noted that the format requested by the Commission for the reports included space for the "Type of Analysis" as one factor and that the ORGDP tables stated the figures referred to uranium concentrations, but the ORNL data were not identified. Mr. Lenhard concluded that the ORGDP air data should be included; in addition, since ORNL gives no alpha activity for the Clinch River, the ORGDP data for uranium concentrations should also be reported.

The data presented on Poplar Creek were briefly discussed, and the possible elimination of these data from the report was suggested by the ORGDP representatives on the basis of the similar treatment of data for White Oak Creek by ORNL. In both cases, the Clinch River data should give information concerning actual environment effects. However, the ORGDP representatives also stated they had no objection to continuing to report the Poplar Creek information. It was noted that no information concerning radioactive materials in the East Fork of Poplar Creek was presented except that obtained by the ORGDP at its intersection with Poplar Creek. Since most of the course of the creek from Y-12 to this point lies within populated and public areas, the possibility that additional information concerning this watercourse should be provided was briefly discussed, but no decision was reached.

In conclusion, Mr. Lenhard stated that the Commission would send Carbide a letter stating essentially the following items:

1. The data presently presented to the Commission were proper and adequate.
2. No changes should be made in these data with the exception of the addition of ORGDP information on air and uranium concentrations in the Clinch River.
3. No data should be reported for which there are no maximum permissible concentrations or maximum permissible limits.

An offer was made that Carbide would probably be willing to initiate a letter containing these conclusions, but Mr. Lenhard preferred that the Commission initiate such a letter.


H. F. Henry
Safety, Fire, and Radiation Control

HFH:mh

February 17, 1961

UNION
CARBIDE

INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY • POST OFFICE BOX P. OAK RIDGE, TENNESSEE

To: (Name) Mr. A. F. Becher
Company
Location

Date March 1, 1961

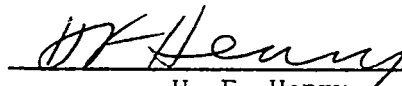
Originating Dept.

Answering letter date

Copy to

Subject Environmental Monitoring

The attached copy of the letter from the Commission confirms the suggestions of J. A. Lenhard at our meeting some time ago. Accordingly, we will report only the air sampling data and the uranium data in the Clinch River. However, for our own protection as well as actual information concerning our possible effects upon the environment, we should continue to obtain our current information which includes soil and vegetation data, the stream bottom of Poplar Creek and Clinch River data, and water data for Poplar Creek, including points just above the inflow of East Fork and just below it. Copies of these data should be placed with our record copies of our report submissions but with the note that, per the attached letter, this was not disseminated. Please advise if there is any other data you think should be included for our own information.


H. F. Henry
Safety and Radiation Control

HFH:mh

Attachment:

Letter from Sapirie to Center, "Dissemination
to the Public of Data on Environmental Levels
of Radioactivity," 2/16/61

No RC



UNITED STATES
ATOMIC ENERGY COMMISSION

Copy forwarded by
W. L. RICHARDSON

IND. REL. DIV.
K. W. SAHLE



Oak Ridge, Tennessee
February 16, 1961

PL 86-1 K2S U.S.N.
FILE
OTHER

ORIGINAL 1961 FEB 24 PM

Union Carbide Nuclear Company
Post Office Box 7
Oak Ridge, Tennessee

Attention: Mr. C. E. Center, Vice President

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON ENVIRONMENTAL
LEVELS OF RADIOACTIVITY.

Gentlemen:

Reference is made to our letter dated August 24, 1960, subject as above, regarding criteria for the formulation of quarterly environmental monitoring reports.

The Oak Ridge Area environmental report as prepared by you for the third quarter of 1960, was found to be satisfactory by several reviews both in Oak Ridge and in AEC Headquarters. It is desirable that the format and data included in the third quarter report should be retained in future reports with the following exceptions.

1. The air sampling data as collected and analyzed by K-25 may be included in the report. In order to avoid possible conflict with ORNL air sampling data, it might be well to clearly identify the maximum permissible concentrations to which the respective sets of data are related.
2. The K-25 Clinch River data for uranium should be substituted for the Poplar Creek data. This change is considered desirable since the Poplar Creek is essentially on-site while the Clinch River uranium data reflects the actual "off-site" situation.

Confirming informal discussions with members of your staff, it is particularly desirable that data for which NCRP or FRC reports do not contain maximum permissible levels should not be included in the subject reports.

Union Carbide Nuclear Company

- 2 -

February 16, 1961

Your cooperation in this matter will be appreciated.

Very truly yours,



S. R. Sapirie
Manager
Oak Ridge Operations

CC: R. C. Armstrong
H. M. Roth

AFB: The attachments are the plant file copies; so far as I know, we have no other copies of the report.

WLR/mhb

W. E. RICHARDSON

9-7-60



1960 JUN 16 AM 11:02

June 3, 1960

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie

Gentlemen:

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON ENVIRONMENTAL
LEVELS OF RADIOACTIVITY

Reference is made to your letter of May 10, 1960 regarding the reports submitted on the above subject. As requested, the data from all sites have been compiled into a single integrated report for each reporting period and ten copies of each report are submitted.

With regard to the sampling period not coinciding exactly with the reporting periods, long-term composite samples covering periods other than calendar quarters had already been processed when data for the present reports were compiled, making it impossible to separate these data on a calendar quarter basis. This matter will be corrected in future reports.

Yours very truly,

UNION CARBIDE NUCLEAR COMPANY

Clark E. Center
Vice President

CEC:EHA:dwh
Enclosures

cc: H. H. Abee (3)
F. R. Bruce
F. L. Culler
L. B. Emlet (4)
W. H. Jordan
J. A. Swartout (2)

M E M O R A N D U M

MEMO TO FILES

SUBJECT: ORGDP Environmental Sampling Program of the Areas Adjacent
to the Plant

On April 13 and 14, 1960, the following samples were taken at the designated sample points located approximately five miles from the ORGDP.

| <u>No. of Samples Taken</u> | <u>Type of Sample</u> |
|-----------------------------|---|
| 11 | Soil |
| 9 | Grass |
| 9 | Pine Needles |
| 18 | Spot air samples with Hi-Vol Sampler |
| 9 | Water |
| 1 | Mud |

57 - Total Samples

| <u>Sampling Point No.</u> | <u>Location</u> |
|-------------------------------|---|
| 10 | South of Plant - Buttermilk Road - 1.4 miles from White Wing Road near bridge. |
| 11 | Southeast of Plant - Bear Creek Road - Right of road near telemetering cable. |
| 12 | East of Plant - Top of Black Oak Ridge. |
| 13 | North of Plant - Off Highway No. 61 near Mt. Pisgah Church. |
| 14 | Northeast of Plant - Sugar Grove Valley - where road crosses Poplar Creek. |
| 15 | Northwest of Plant - Near bridge on Highway No. 61 at Little Emory River. |
| 16 | West of Plant - Dickey Valley at Emory River. |
| 17 | Southwest of Plant - One-half mile east of Lawnville off of Gallaher Road. |
| 18 | West of Plant - Farm Pond off Highway 58 - 15.9 miles by highway from plant. Near sign on road indicating - Rad. to Angler's Cave. |

Lab results of the samples are not complete at this date.

NDB:1a
4/18/60


N. D. Barker

UNION
CARBIDE

INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY • POST OFFICE BOX P. OAK RIDGE, TENNESSEE

To (Name)
Company
Location

Dr. H. F. Henry
K-1001

Date

March 31, 1960

Originating Dept.

Answering letter date

Copy to

Subject

ORGDP Environmental Sampling
Program of the Areas Adjacent
to the Plant

The proposed program for the sampling of the neighborhood adjacent to the plant environs for radioactive material fallout from plant vent stacks or discharge in plant effluents is directed toward assessment of both the short-term and long-term effects of these plant effluents on the contamination of air, water, and soil and its subsequent uptake in vegetation or foliage. The preliminary survey will be made to establish background values at sampling points established on a five-mile radius from the plant center at the major compass points and will include upwind, downwind, and crosswind locations from the plant. The information received should aid in determining future sample points required for adequate routine evaluation.

Air samples will be taken with a hand-operated pump-type sampler, using Whatman No. 41 filter paper, until such time that a mobile power supply is available and continuous air monitors can be utilized. Surface water samples will be taken from ponds or streams where available at the sample points; in addition, undrained ponds on Watts Bar and Norris Lakes in the path of prevailing winds at remote distances from the plant will be taken for background information. Soil samples will be taken of the top two inches since it has been established by other investigators that most of the material remains in the upper portion of the soil; for example, Weinstein¹ found about two to three times as much uranium deposited in the first inch of soil as was in the next five. However, it was also noted that where soluble forms of uranium were released, the residual concentration in soil was fairly uniformly distributed throughout the top six-inch layer. Therefore, in two of the sample locations, additional samples will be included of the four inches of subsoil to check for such possible dispersal. Vegetation samples will consist of both pine needles and grasses. The roots of the grass will be included since some investigators have found that significant amounts of the uranium taken up by some plants

¹ United States Atomic Energy Commission, New York Operations, Symposium on Occupational Health Experience and Practices in the Uranium Industry, pp. 180-184, 1959

March 31, 1960

remain in the roots.

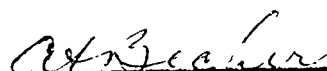
Samples will be taken on the top of the ridges as well as in the adjacent valley to check elevation differences, and all results will be correlated with wind conditions to determine the possible effects of this factor on material accumulation. The AEC Weather Bureau has agreed to furnish us with a wind chart of the CRGDP area.

The preliminary sampling plan is shown in the attachment.

AFB:GCH:la

Attachment
(Program for Environmental Sampling
of the CRGDP Area - 3/31/60)

No RC


A. F. Becher
Safety and Health Physics

PROGRAM FOR ENVIRONMENTAL SAMPLING OF THE ORGDP AREA

PRELIMINARY SAMPLING PROGRAM

1. No. Sampling Points - 8 (on five-mile radius from plant center at major compass points).
2. No. Samples - *10 - Soil samples
 - 8 - Grass samples (include plant root systems)
 - 8 - Pine needles
 - 8 - Spot air samples
 - 10 - Water sample (includes also stagnant ponds for evaluation of bomb fallout)

—
Total Samples 44

* At all locations, soil samples shall be taken at two-inch depths. At two of these locations, an addition of four inches of the sub-soil will be taken as a separate soil sample.

3. Analysis Required - Uranium
 - Alpha Activity
 - Beta Activity
 - Fluorides as requested by Medical

Total Lab Analyses - 132.

4. Sample Frequency - one each quarter.
5. Time Required for Sampling - approximately two days.

Sampling Points Five Miles From Plant

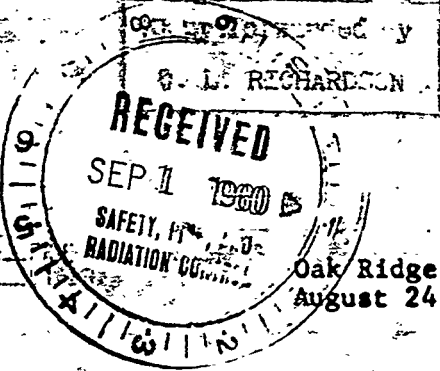
1. Southeast of Plant - Buttermilk Road - one-half mile east of Macedonia Church near Roane - Loudon County Line (across White Wing Bridge).
2. East of Plant - Bear Creek Valley at Douglas Chapel and cemetery near Roane - Anderson County Line.
3. Northeast of Plant - Atop Black Oak Ridge (elevation - 1000 ft.) Road turns off turnpike at Scott Cemetery.
4. Northeast of Plant - Sugar Grove Valley - Where road crosses Poplar Creek.
5. Southwest of Plant - Gallaher Road about one-half mile northeast of Lawnville.

6. West of Plant - Dickey Valley at Dickey Cemetery.
7. Northwest of Plant - West of Elverton at Highway 61 bridge across Emory River.
8. North of Plant - Off Highway 61 near Mt. Pisgah Church.

GSH:la

Safety and Health Physics
Industrial Relations Division

March 31, 1960



ORB:JAL

Oak Ridge, Tennessee
August 24, 1960

LEE 8/26/60

Union Carbide Nuclear Company
Post Office Box P
Oak Ridge, Tennessee
Attention: Mr. C. E. Center, Vice President

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON ENVIRONMENTAL
LEVELS OF RADIOACTIVITY

Gentlemen:

Reference is made to our letter to you dated March 21, 1960, concerning the above subject.

The environmental reports for 1959 and for the first quarter of 1960, issued to date, have been reviewed in light of the Commission's objective to provide meaningful information to the local public on its exposure to radiation and to radioactive materials. Following is a list of suggestions which should be observed in the preparation of the third quarter 1960 and subsequent reports. It is noted that some of the suggestions have already been incorporated into the previous UCNC Oak Ridge reports.

1. Maps, with sampling or monitoring stations clearly identified, should be used to show locations of such stations relative to (a) the plant and its perimeter, and (b) surrounding towns and other well-known landmarks. For some contractors, two or more maps, using different scales, will be desirable.
2. In general, data should be identified with locations given on the maps. In any event, locations should be as specific as circumstances permit.
3. It has been suggested in a previous memorandum that, where many observations are made at one location, it is sufficient to tabulate maximum and average values and number of observations or samples. While minimum values generally do not contribute to estimates of exposure, they should be included if considered significant. If sampling is continuous over considerable periods of time, or if composite samples are used, these characteristics should be appropriately described. A number of reports issued in first round were deficient in some of these respects.

August 24, 1960

4. All standards of comparison should be clearly identified; e.g., NCRP, NBS HB 69, p. ---. Some reports have made comparisons with values which we assume to be local guides since we are unable to identify them with other sources. If local guides are mentioned in the report, they should be compared with generally accepted standards.

Attention is called to the recommendations of the National Committee on Radiation Protection, NBS Handbook 69, page 6, paragraph 2.4, and to those of the International Commission on Radiological Protection, Committee II, pp. 5, 6, paragraph 3 (printed as Volume 3 of HEALTH PHYSICS, June 1960), which provide that exposures of population groups in the vicinity of nuclear energy plants should be limited to one-tenth of occupational values, averaged over the total diet and over periods up to one year.

Attention is also called to the recommendations of the Federal Radiation Council as contained in their Report No. 1 and in the Memorandum to the President which has been approved by the President for guidance of Federal agencies. Further reports are in the process of preparation and will be issued from time to time. Where standards established by the Federal Radiation Council are applicable, they should be considered as primary standards for AEC operations.

5. Data which are not or cannot be interpreted in relation to standards of protection should not be included. For example, it is difficult to interpret the significance of a measured number of particles per unit of volume of air or per unit of area on the ground. If data of this type are considered valuable, it is the responsibility of the author of the report to make the data meaningful.

6. Each report should contain an introduction. The introduction should scope the nature of the report and relate the materials in the report to the objectives which the report is trying to accomplish.

7. Reports should include appropriate summaries or conclusion designed to show the impact of operations on environmental conditions by such devices as comparison with natural background, preceding environmental levels in the same locations, established standards, etc.

Union Carbide Nuclear Company

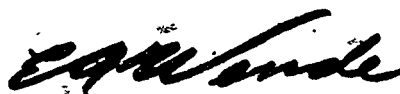
- 3 -

August 24, 1960

As soon as copies of the second quarter 1960 and future reports are prepared, 60 copies of each report should be forwarded to this office in order that the necessary reviews and distribution may be made.

Your cooperation in this matter will be appreciated.

Very truly yours,



S. R. Sapirie
Manager
Oak Ridge Operations

CC: R. C. Armstrong
H. M. Roth

Copy forwarded by

W. L. RICHARDSON

CC: A. F. Huber
R. G. Jordan
J. F. Murray

Oak Ridge, Tennessee
June 1, 1960

LAX 6/3/60

Union Carbide Nuclear Company
Post Office Box 117
Oak Ridge, Tennessee

Attention: Mr. C. E. Center, Vice President

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON ENVIRONMENTAL
LEVELS OF RADIOACTIVITY

Gentlemen:

Reference is made to my letter of March 21, 1960, which set the date of June 1, 1960, for the issuance of environmental monitoring reports for 1959 and for the first quarter of 1960.

The issuance date has been postponed until about July 1, 1960, in order to allow sufficient time for Headquarters review. Additional information with regard to the acceptability of the reports submitted by you and with regard to the new issuance date will be forwarded when it becomes available.

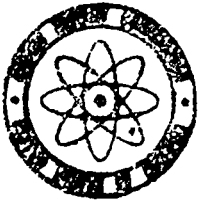
Your cooperation in this matter will be appreciated.

Very truly yours,

S. R. Sapirie
S. R. Sapirie
Manager
Oak Ridge Operations

CC: R. C. Armstrong
H. M. Roth
N. A. Shearon
L. M. Groeniger





UNITED STATES
ATOMIC ENERGY COMMISSION

IN REPLY REFER TO:

ORR-JAL

Oak Ridge, Tennessee
January 12, 1960

Union Carbide Nuclear Company
Post Office Box P
Oak Ridge, Tennessee

Attention: Mr. C. E. Carter, Vice President

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON ENVIRONMENTAL
LEVELS OF RADIOACTIVITY

Gentlemen:

Reference is made to my letter of April 2, 1956, which encouraged AEC contractors to issue periodic summary reports on off-site environmental contamination.

As a result of increasing public interest in the subject of radiation exposure, and in conformance with Commission policy, it has become desirable to systematically provide the public with routine information on environmental levels of radioactivity resulting from AEC operations. While much of this information can be obtained from unclassified reports, such information generally is not conveniently available to the local public. It is, therefore, planned to institute a system of periodic environmental reports to meet this need.

Tentative plans are as follows:

1. Each contractor installation will be asked to prepare, on a quarterly basis, reports of which the primary purpose is to present to the local public all available data on environmental levels of activity resulting from the operation of the particular installation. Such reports will be released to local news media one month after the end of the calendar quarter, with copies available upon request at a nominal price.
2. Quarterly reports will contain unclassified or declassifiable measurements of concentrations of radioactivity in the environment obtained by the contractor for the purpose of evaluating the impact of his operation on the environment. In preparing the report, it is expected that the contractor will not only

January 11, 1960

consider the necessity for making an understandable presentation to the public, but will review the nature and scope of the information presented from the point of view of adequate coverage.

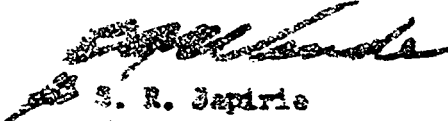
3. To initiate the program, it is proposed that in addition to preparing the first report in this series to cover the first calendar quarter of 1960, the contractor should prepare a summary report for the year 1959. The summary report should contain sufficient representative and accurate data to provide a good evaluation of environmental conditions during 1959, together with appropriate explanatory text. Such summary would be released concurrently with the first quarterly report, May 1, 1960. To insure reasonable uniformity of treatment, drafts of the first quarterly and the summary report would be reviewed by the AEC before publication.
4. On the basis of contractor reports, it is anticipated that AEC Headquarters will provide annual summaries on a Commission-wide basis.

To facilitate the detailed formulation of firm plans for the proposed program, a representative from each of your installations may be invited to attend a meeting to be held in the auditorium at AEC Headquarters, Germantown, Maryland, beginning at 9:30 a. m. on January 27, 1960.

In the event that you anticipate any significant problems in preparing and disseminating such information, it is requested that we be advised by January 20, 1960, in order that such matters can be resolved prior to the Headquarters meeting.

Your cooperation in this matter will be appreciated.

Very truly yours,


S. R. Japrie
Manager
Oak Ridge Operations

cc: E. C. Armstrong
Norman H. Roth

Dr. Henry: Please note deadline.

WLR/mhb 4/8

Copy forwarded by
W. L. RICHARDSON



ATOMIC ENERGY COMMISSION

A.P. Huber
R.G. Jordan
J.P. Murray

Please see my 3/23 memo on this subject. Will you please get your report to Jim Hart no later than 4/20/60. Paducah should handle this report with K. C. Brooks.

LBE

ORIGINAL

Union Carbide Nuclear Company
Post Office Box P
Oak Ridge, Tennessee

Attention: Mr. C. E. Center, Vice President

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON ENVIRONMENTAL LEVELS OF RADIOACTIVITY

Gentlemen:

Reference is made to our letter dated March 21, 1960, concerning the above subject.

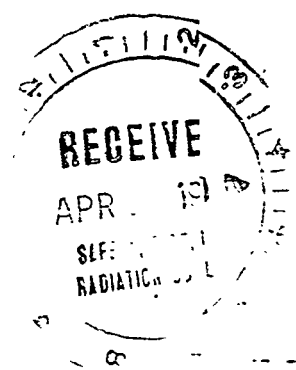
Ten draft copies of each of the reports must be received in ORO by April 27, 1960, for transmittal to AEC Headquarters for review. Each of your installations should prepare an annual report for 1959 and a first quarter report for 1960.

Your cooperation in this matter will be appreciated.

Very truly yours,

S. R. Sapirio
Manager
Oak Ridge Operations

CC: R. C. Armstrong
H. M. Roth
N. A. Shearon
L. M. Greeniger



COPY

INTRA-LABORATORY CORRESPONDENCE

Oak Ridge National Laboratory

February 5, 1960

To: J. C. Hart

Re: Dissemination to the Public of Data on Environmental Levels of Radioactivity

As the representative of Union Carbide Nuclear Company, Oak Ridge, I attended a meeting at AEC Headquarters, Germantown, Maryland, on January 27, 1960, for the purpose of discussing and formulating plans with regard to the above subject. The meeting was under the direction of the Office of Health and Safety and was attended by representatives of most prime contractors and AEC operations offices.

Mr. William F. Finan, Assistant General Manager for Regulation and Safety, opened the meeting with a statement of Commission policy and background information. He stated that the Commission policy is to make public all unclassified and declassified measurements of concentrations of radioactivity in the environment obtained by the contractors for the purpose of evaluating the impact of their operations on the environment. In August of 1959, a presidential executive order assigned to the Department of Health, Education and Welfare (HEW) the responsibility, within the Executive Branch, for the collation, analysis, and interpretation of data on environmental radiation levels, and requested participation of all federal agencies having such data. The Commission hopes that reports on environmental radioactivity measurements prepared by the prime contractors for dissemination of information to the public will satisfy the AEC's responsibility in this report.

Dr. Forrest Western presented the tentative plan for the program. Each prime contractor will be asked to prepare, on a quarterly basis, reports of which the primary purpose is to present to the local public all available data on environmental levels of radioactivity resulting from the operation of the particular installation. The report should not contain data unrelated to plant operations, e.g., fallout data or natural background, except as such data may be required for proper interpretation of raw data. In preparing the report, it is expected that the contractor will not only consider the necessity for making an understandable presentation to the public, but will review the nature and scope of the information presented from the point of view of adequate coverage. The report should be a matter of fact account with no attempt being made to slant the information in any way. It should be written in such a way that maximum understanding of the data can be obtained by such people as local public health authorities, local news media, and the average individual in the community. No particular format was prescribed for the report at this time. The Commission felt that each prime contractor could determine the best format for its data which might be peculiar to its operation and location. A more uniform format might be prescribed at a later date. However, the data should be reported in a uniform system of units and the units recommended were those

COPY

used by MCRP. In the case of air and water, the units should be $\mu\text{c}/\text{cc}$ and for food and vegetation, the units should be $\mu\text{c}/\text{g}$. Radiation intensity should be quoted as mr/hr for gamma and mrad/hr for beta radiation.

Reports will be released to local news media one month after the end of the calendar quarter, with copies available upon request at a nominal price. The first quarterly report will cover the first calendar quarter of 1960 and will be issued May 1, 1960. The issue of the report will be accompanied by a local news release. Simultaneously, the AEC will issue an appropriate news release from Washington, giving the information that such reports are being prepared and issued on a local basis but without any data. In addition to the series of quarterly reports, it was proposed that each contractor shall prepare, for issue May 1, 1960, a summary of environmental levels of radioactivity observed during the calendar year 1959. The summary report should contain sufficient representative and average data to provide a good evaluation of environmental conditions during 1959, together with appropriate explanatory text.

To insure reasonable uniformity of treatment and freedom from classified information, drafts of the first quarterly report for 1960, and of the summary report for 1959, will be reviewed by the Headquarters staff of the AEC before they are issued.

There was considerable discussion concerning problems of reporting, issuing of press releases, publishing of reports and the general mechanism of handling the program. It was pointed out that the plans were tentative and that final details of the program remained to be settled. Details with respect to the mechanics of the program will be set forth in later correspondence from AEC Headquarters.

H. H. Abbe

HHA:de

cc: A. D. Warden
D. M. Davis
W. D. Cottrell
HHA File

Copied 3/23/60:mh

WLR- 3cc

COPY

MEMO TO FILE

SUBJECT: Meeting - 1/25/60 - 9:00 a.m.

Present: Mr. H. H. Abee, ORNL
Mr. J. C. Hart, ORNL
Dr. H. F. Henry, ORGDP
Mr. J. D. McLendon, Y-12

This meeting had been arranged by managements of the various plants to see that the Carbide representative from Oak Ridge to a Commission meeting to discuss the implications of the recent AEC directive concerning the release of environmental data to the press was aware of the problem of all of the plants, and thus could represent all UCNC facilities in Oak Ridge. The Oak Ridge representative is Mr. H. H. Abee of ORNL.

Mr. Hart briefly reviewed the air sampling locations maintained by ORNL outside of the plant, pointing out that currently air samples are obtained at each of the old AEC portals which formerly controlled entrance to the controlled area and at many of the TVA dams surrounding the Oak Ridge territory. The details of this environmental program are being released in the 1958 annual report of the ORNL Health Physics Division. (Note: This may be a 1958-1959 report.)

It was agreed at the outset that this meeting would concern itself primarily with a review of what data are currently collected and available and could thus be readily fitted in with the present activities of the various plants. This would then provide Mr. Abee with information so that he could make the others present at the meeting aware of any undue hardships which their proposals might work on any of the UCNC facilities, and would also permit him to make appropriate suggestions and comment.

There was some discussion concerning the information which it appeared the Commission expected in accord with its request, the format of the release, and the mechanics of transmittal to news media. It was the consensus of the group that the report should probably include a rather detailed over-all review accompanied by a cover evaluation sheet; it also appeared that, although the Commission would handle the first two releases, the various companies themselves would be responsible for succeeding releases.

Although it was recognized that any decision concerning the content or other details of the news releases would be appropriately made, the following factors appeared to be generally agreeable technically to the various groups.

1. Every report of this type should be accompanied by a map showing sample locations.
2. The actual figures should be given but these should be accompanied by comparisons to maximum permissible concentrations. In addition, consideration may also be given to comparisons with background, or past experience where such are available and valid.

3. No data concerning conditions inside a plant should be given except as they are used to indicate that there could be little or no environmental problem outside the facility.
4. The minimum time covered by any figure reported should be one week. Longer periods would be desirable.
5. In so far as possible, any unusual changes in measured activity should be explained. Since such changes in the air, for example, can result from meteorological change or from such items as both American and Russian bomb tests, it appeared important that any reports to the press should be careful to indicate whether or not a change in levels could be attributed in any way to plant operations, whether it could be otherwise explained or not.

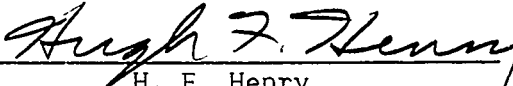
With respect to air, it was noted that data concerning gross beta activity were currently available from the remote locations described above. The possible necessity for obtaining similar alpha activity data, possibly at the old guard portals, was mentioned, as was the fact that the ORGDP, in testing a continuous type of sampler, has obtained considerable background data; some of this information has shown that the radon background can be much higher than has previously been expected.

With respect to materials released to the public streams, it was pointed out that the ORGDP currently routinely monitors the input water to its sanitary system for beta activity as well as other items as indicated, and these data would thus provide a check point for the activity released by ORNL to the Clinch River. Additional check points maintained by ORNL further down stream were mentioned as was the possibility that ORNL might consider a sampling point near the mouth of White Oak Lake.

It was also agreed that the current ORGDP program of sampling the mouth of Poplar Creek would provide the necessary data concerning activity released to the Clinch River from both Y-12 and the ORGDP, and that routine sampling by Y-12 in the East Fork of Poplar Creek should perhaps be considered.

With respect to other environmental conditions, it appeared that limited spot checks of activity in the vegetation of areas near the plants on an annual basis would be rather feasible, but that if more extensive vegetation or soil checks or checks on the animal life appear desirable, this would necessitate additional funds.

Pending the results of the meeting itself, as well as further plant studies, no attempts were made, other than as noted above, to determine the adequacy and effectiveness of the various plant programs or additional information that should be recommended.


H. F. Henry
Safety, Fire, and Radiation Control

HFH:mh

1/28/60



INTERNAL CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P, OAK RIDGE, TENNESSEE

To (Name) Mr. L. B. Zlot
Company
Location R-1001

Date January 13, 1960

Originating Dept.

Answering letter date

Copy to

Subject Reporting of Environmental
Levels of Radioactivity

With respect to your note of January 14, 1960, concerning a letter from the Commission advising of plans to report environmental levels, we have the following comments:

1. Although there would be no objection to the simultaneous distribution of information with respect to the individual sites from a single location, we believe it would be wiser to combine the data from all of the Oak Ridge sites into a single integrated review. This opinion is based primarily upon our feeling that, in the event one of the sites should show either abnormally high environmental levels or special problems, an integrated report would tend both to condemn all operations in Oak Ridge and to indicate that the problem is more widespread and hence of greater significance than may actually be the case.
2. We would like to recommend that the type of information being distributed be rather carefully and specifically identified so that all reports would give compatible data. We presume that the meeting being held in Germantown on January 27 will have this as a major item of discussion.
3. We believe it would be very desirable at the time a program of this type is initiated that the intentions of the Commission as well as explanations of the meaning and significance of the data being presented be carefully explained for the benefit of the general public. With respect to the reports themselves, we believe that attempts should be made to avoid emphasizing these comparatively few cases where conditions in excess of the permissible limits are observed in favor of emphasizing the long-term average environmental conditions with the unusual conditions being presented in the proper framework. This is, of course, the basis upon which permissible limits have been established.

Mr. L. D. Ealey

-2-

January 12, 1969

We should perhaps mention that we actually have not found it necessary to attempt an extensive environmental monitoring program outside of our own controlled area. We do monitor the Clinch River, the water at the mouth of Poplar Creek, our own effluents into Poplar Creek, and the area both in Poplar Creek and Clinch River. With respect to air contamination, we have monitored our stack discharges and the general air within the plant boundaries. Since there has been little indication of activities approaching the permissible limits within these boundaries, we have considered it very improbable that any significant air contamination problem, certainly on a widespread basis, could be anticipated outside of our plant area. We do have some soil sampling of vegetation and soil within the plant area and have a rather sketchy background study of the plant environment prepared in 1968.

With respect to the meeting in Germantown, we have no objection to the Oak Ridge area being represented by an ORNL employee, but do suggest that he be familiar with the conditions at Y-12 and the ORNL so that he may interpret their problems in implementing any decisions made, especially if these would involve extensive additional monitoring programs.

S/A.P. Huber

A. P. Huber

WPH:ash

IND. REL. DIV.
K. W. BAKER



INTERNAL CORRESPONDENCE

FILED
JAN 14 1960
FBI - MEMPHIS

1960 JAN 18 AM 11:43

UNION CARBIDE NUCLEAR COMPANY • POST OFFICE BOX 7, OAK RIDGE, TENNESSEE

To (Name) A. P. Huber
Company R. G. Jordan
Location J. P. Murray
J. A. Swartz

Date January 14, 1960

Originating Dept.

Attaching letter date

Clerk T. E. Lane

Subject Reporting of Environmental
Levels of Radioactivity

Please note the attached letter from the Commission, which requests quarterly reports on environmental levels of radioactivity for public release.

I have discussed this with Ray Armstrong as well as Ramsey, and it appears that we can eliminate the number of such reports by issuing a combined report for Oak Ridge and a separate report for Paducah. Y-12 and ORGDP will furnish their information to ORNL, and ORNL in turn will incorporate the information into an Oak Ridge report.

You will note that a meeting is scheduled for January 27 at Germantown. It may be possible to reduce the number of persons attending this meeting by having one representative from ORNL and one from Paducah.

Will you please advise me of what you wish to do by Monday, January 18.

L. B. Enlet
L. B. Enlet

LBE:le

Attachment:
AEC letter, 1-12-60

INTER-COMPANY CORRESPONDENCE
UNION CARBIDE NUCLEAR COMPANY
Division of Union Carbide Corporation

To: Mr. M. E. Ramsey
Oak Ridge National Laboratory

Plant: Oak Ridge Gaseous Diffusion

Date: December 9, 1957

Copies To: Mr. K. W. Bahler
Mr. L. B. Ehlert
Mr. R. G. Jordan
Mr. J. P. Murray

Subject: Environmental Monitoring
Procedures

As requested by Mr. Ehlert, we are forwarding the following data for inclusion in the four-plant reply to Mr. Sapir's letter of November 12, "Environmental Monitoring Procedures":

1. Environmental Monitoring Procedures, OEGDP, giving air monitoring stations for radioactive materials and other air contaminants.
2. OEGDP Drainage Area Map Showing Continuous Water Sampler Locations, with Table I, Water Survey Sampling, and Table II, Water Survey Analyses.

APB:mbb ✓


A. P. Huber

Attachments
Described abv (In trip.)

Re RC



ENVIRONMENTAL MONITORING PROCEDURES

Oak Ridge Gaseous Diffusion Plant

SAMPLE FREQUENCY

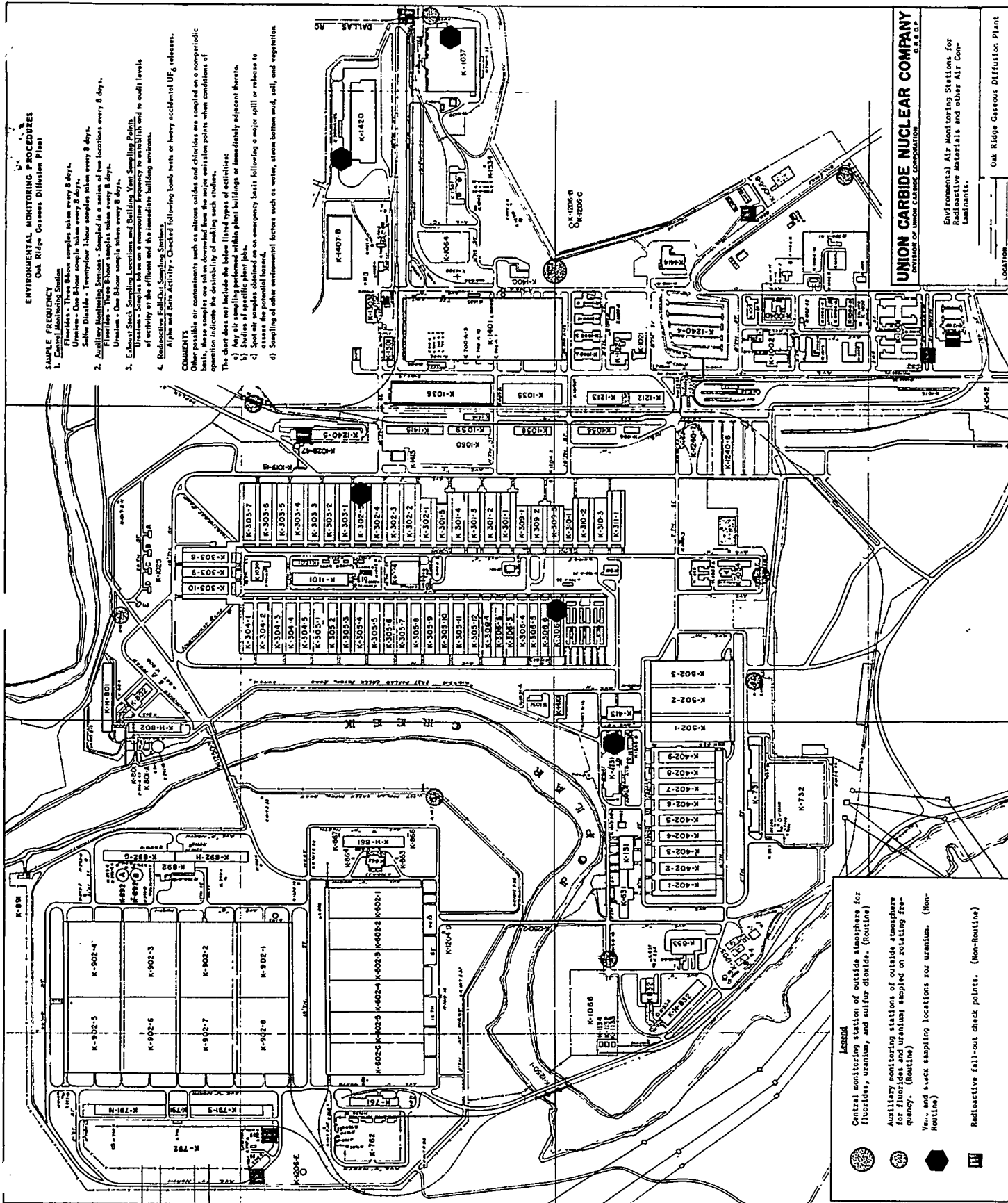
1. Central Monitoring Station
Fluorides - Three 8-hour samples taken every 8 days.
Uranium - One 8-hour sample taken every 8 days.
Sulfur Dioxide - Twenty-four 1-hour samples taken every 8 days.
Auxiliary Monitoring Stations - Sampled in a series of two locations every 8 days.
Uranium - One 8-hour sample taken every 8 days.
Fluorides - One 8-hour sample taken every 8 days.
2. Radiometric Fall-Out Sampling Stations
Uranium - Sample taken every 8 days.
Fluorides - Sample taken every 8 days.
Sulfur Dioxide - Sample taken every 8 days.
of activity of the effluent and the immediate building environs.
3. Radiometric Fall-Out Sampling Stations
Uranium - Sample taken every 8 days.
Fluorides - Sample taken every 8 days.
Sulfur Dioxide - Sample taken every 8 days.
of activity of the effluent and the immediate building environs.
4. Alpha and Beta Activity - Checked following bomb tests or heavy accidental UF₆ releases.

COMMENTARY

Other than the air contaminants such as aerosols, oxides and chlorides are sampled on a periodic basis, these samples are taken from the major emission points when conditions of operation indicate the desirability of making such studies.

The chart does not include the below listed types of activities:

- a) Any air sampling performed within plant buildings or immediately adjacent thereto.
- b) Studies of specific plant jobs.
- c) Spot air samples obtained on an emergency basis following a major spill or release to assess the potential hazard.
- d) Sampling of other environmental factors such as water, storm bottom mud, soil, and vegetation.



UNION CARBIDE NUCLEAR COMPANY
DIVISION OF UNION CARBIDE CORPORATION

Environmental Air Monitoring Stations for
Radioactive Materials and other Air Con-
taminants.

Location: Oak Ridge Gaseous Diffusion Plant

FIGURE 1

ARGDP DRAINAGE AREA MAP SHOWING CONTINUOUS
WATER SAMPLER LOCATIONS

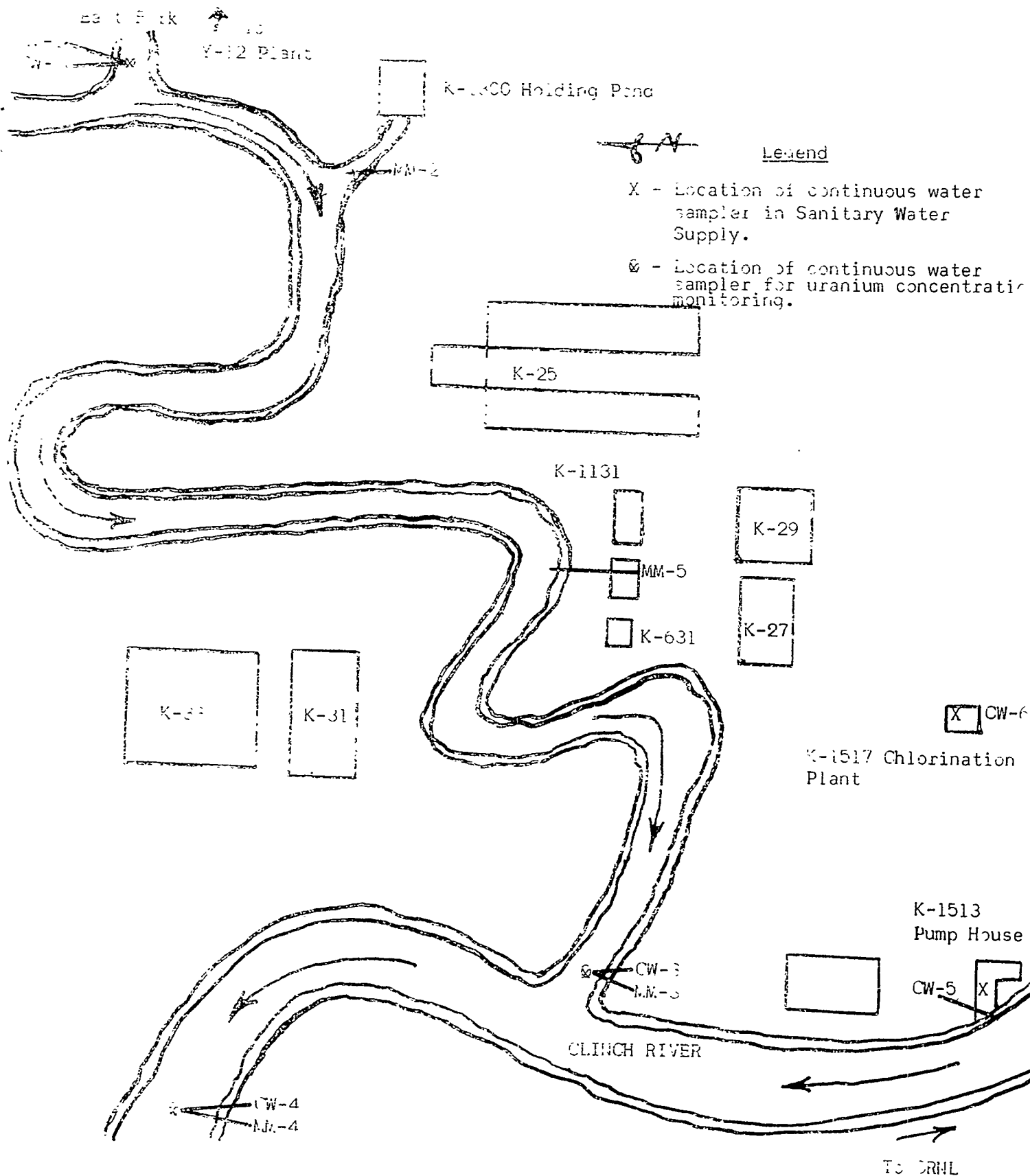


TABLE 1
WATER SURVEY SAMPLING

| <u>Plot No.</u> | <u>Frequency of Sampling</u> | <u>Sampling Location</u> |
|-----------------|--|--|
| CW-1 | Biweekly | East fork junction with Poplar Creek |
| CW-2 | Monthly | Poplar Creek opposite K-27 drain |
| CW-3 | Biweekly | Poplar Creek at junction with Clinch River |
| CW-4 | Biweekly | Clinch River one mile below junction with Poplar Creek |
| CW-5 | Biweekly | Sanitary water pumphouse influent |
| CW-6 | Biweekly | Effluent from CKGDP Water Purification Plant |
| CW-7 | Biweekly | Clinch River intake of make-up cooling water at K-901 |
| DW-1 | Weekly - Include cafeteria cooking water at least once monthly | Plant drinking water |
| DW-3 | Monthly composite of weekly samples | Drainage from Labs. A, B, C, and D |
| LDA-1 | Monthly | Bottom mud, east fork at junction with Poplar Creek |
| LDA-2 | Monthly | Bottom mud of K-1300 drain at junction with Poplar Creek |
| LDA-3 | Monthly | Bottom mud of Poplar Creek at junction with Clinch River |
| LDA-4 | Monthly | Bottom mud of Clinch River one mile below junction with Poplar Creek |

Water Survey Sampling (Continued)
 Page 2

| <u>Plot No.</u> | <u>Frequency of Sampling</u> | <u>Sampling Location</u> |
|-----------------|------------------------------|--|
| W-5 | Monthly | Bottom mud of Poplar Creek opposite the K-27 drain |
| W-7 | Sample each batch as dumped | Sludge, Sewage Disposal Plant |

GSH:msp
 November 26, 1957
 UCNC - ORGDP

TABLE --
WATER SURVEY ANALYSES

| <u>Plot No.</u> | <u>Type of Sample</u> | <u>Type Analyses</u> |
|-----------------|-----------------------|---|
| CW-1 | 3-4 day composite | Beta activity, uranium, fluorides, and pH |
| CW-2 | Spot sample | Beta activity, uranium, and pH |
| CW-3 | 3-4 day composite | Beta activity, uranium, fluorides, and pH |
| CW-4 | 3-4 day composite | Beta activity, uranium, fluorides, and pH |
| CW-5 | 3-4 day composite | Beta activity, uranium, and pH |
| CW-6 | 3-4 day composite | Beta activity and fluorides |
| CW-7 | 3-4 day composite | Beta activity and uranium |
| DW-1 | Spot sample | Beta and alpha activity, and uranium |
| DW-3 | Spot sample | Beta and alpha activity |
| MM-1 | Spot sample | Beta and alpha activity, and uranium |
| MM-2 | Spot sample | Beta and alpha activity, and uranium |
| MM-3 | Spot sample | Beta and alpha activity, and uranium |
| MM-4 | Spot sample | Beta and alpha activity, and uranium |
| MM-5 | Spot sample | Beta and alpha activity, and uranium |
| MM-7 | Spot sample | Beta and alpha activity, and uranium |

GSH:msp
November 26, 1957
UCNC - ORGDP

INTER-COMPANY CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

Division of Union Carbide Corporation


To: Dr. H. F. Henry
Plant: Oak Ridge Gaseous Diffusion
Date: November 27, 1957
Subject: Environmental Monitoring
Procedures at CRGDP for
Radioactive Materials
Copies To:

Attached hereto is information concerning the monitoring procedures for the sampling of environmental air and water at the ORGDP for radioactive materials as requested in Mr. Sapirie's letter to Mr. C. E. Center, dated November 17, 1957.

The map of the plant layout indicates the various types of air monitoring programs established for the operations concerned; these include the continuous shift-length samples obtained by the Operations Group, audit spot samples and job breathing zone samples, and fallout monitoring locations; also included are exhaust stacks used for radioactive particulates which have been monitored from time to time. Where routinely performed, the frequency of sampling for each location is indicated.

From the accompanying plot plan of the ORGDP Area drainage system, the water and mud sampling points may be located. The plot numbers indicate the frequency of sampling and types of analyses as described in Tables I and II.

You may wish to point out that, in addition to the monitoring program described, we now have 10 of the new continuous air samplers and analyzers, which it is expected will be placed in service by the first of the year. Further, modification of the water sampling analysis may be possible if the new procedure utilizing an ion-exchange column for the separation of Strontium 90 now being studied is successful. It is hoped this procedure will give faster detection of changes in radioactivity levels and more effective hazard evaluation of the beta activity in the sanitary water supply.


A. F. Becher
Safety and Health Physics

AFB:msp

NoRC

Attachments